

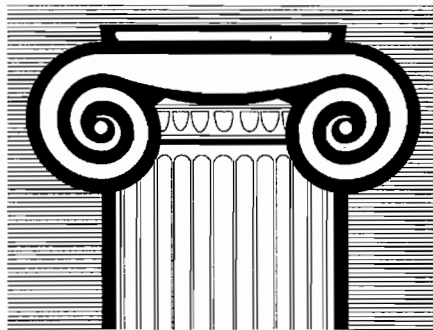


# *Hampton Inn*®

Flowood, Mississippi  
98 Units

Owner:  
**SOUTHERN HOSPITALITY SERVICES, LLC**

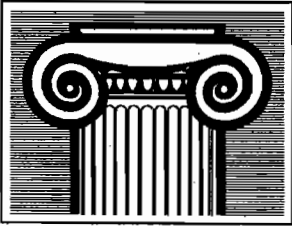
84 GRANDVIEW CIRCLE  
BRANDON, MS 39047  
(601) 829-9898  
(601) 829-9922 FAX



**RICHARD F. STELDT**  
**= ARCHITECT =**

(262) 502-4500

N85 W16058 APPLETON AVE., MENOMONEE FALLS, WI 53051



**RICHARD F. STELDT**

**ARCHITECTURE**

**PLANNING**

**ARCHITECT**

**DESIGN**

N85 W16058 APPLETON AVENUE, MENOMONEE FALLS, WI 53051

PHONE: 262-502-4500 - E-MAIL: rfsteldt@sbcglobal.net - FAX: 262-502-4510

**ADDENDUM TO THE PLANS & SPECIFICATIONS FOR:**

**PROJECT:** Hampton Inn  
Flowood, MS

**ADDENDUM NO:** 1

**DATE OF ISSUANCE:** 2-29-08

**OWNER:** Southern Hospitality Services, LLC  
84 Grandview Circle  
Brandon, MS 39047

**ARCHITECT:** Richard F. Steldt

**PROJECT NO:** 2232-1107

THIS ADDENDUM IS ISSUED TO MODIFY, EXPLAIN, OR CLARIFY THE ORIGINAL DRAWINGS AND SPECIFICATIONS AND IS HEREBY MADE A PART OF THE CONTRACT DOCUMENTS.

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**GENERAL:**

All plans are re-issued and re-dated February 29, 2008 for the purposes of construction. Plans have been revised for City, Owner and Franchise reviews as follows:

**ITEM:**

1. Indoor swimming pool has been downsized to 500 s.f. See attached drawing A-5 (and associated Structural/M.E.P. plans). Note: Pool contractor to provide automatic water drain and two skimmers in pool package.
2. Deluxe king room type furniture layout is modified per A-12. See revised electrical plans reflecting this layout.
3. Note that wall section on Sheet A-21 and A-22 is modified to show window/P-TAC unit adjoining per details shown on same Sheet A-21.
4. Doors to vending rooms, business center, guest laundry and swimming pool have been modified to include glass windows. See A-32.
5. Business Center counter top to have grommets for power cords for desk top equipment. See A-36.
6. Flag pole and its lighting are relocated per Sheet A-1 and associated electrical plans..

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Addendum #1

Project: Hampton Inn – Flowood, MS  
Project # 2232-1107

Date of Issuance: 2-29-08

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7. Two quadplex outlets behind front desk are relocated to allow entire rear wall to be clear for Hyatt graphics. See electrical plan.
8. Exterior building flood lights have been revised for 400 watt fixtures. See revised electrical plan.
9. Electrical circuit for entry sign designated to be placed at OLD Fannin Road. See revised electrical.
10. Pavement under porte-cochere revised to stamped concrete. See Sheet A-1.
11. 4'-0" high ceramic tile wainscot added to pool interior.
12. All metal finishes in pool interior to be aluminum, stainless or corrosive resistant.
13. Washer pad raised 6". See revised Sheet A-5 for location. Verify overall size with washer supplier.
14. Closet removed from Meeting Room to make wet bar longer. See revised plans.
15. Guest Room tubs changed to steel with granite surrounds.
16. All vanity sinks to be under top mounted. See revised plumbing plans.
17. Guest Room bath floor to be 12" x 12" ceramic. Verify manufacturer and color with Owner.
18. Clarification: C.M.U. veneer on building to have split face finish. Verify color with Owner.
19. See revised room finish schedule for floor and base modifications.
20. See revised plumbing plans for elevator sump, pool drainage, and vestibule drain.
21. See revised electrical plans for location of remote thermostat location for P-TAC units.

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Addendum #1

Project: Hampton Inn – Flowood, MS  
Project # 2232-1107

Date of Issuance: 2-29-08

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22. See revised Architectural and Electrical plans for Lobby and Pantry upgrades.

23. See revised plans for increased elevator size for code update. One elevator to be Thyssenkrupp Kingswood 40; a 4000# oildraulic elevator or Architect approved equal.

END OF ADDENDUM #1

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ISSUED:

ACCEPTED:

BY:

Architect

BY:

Contractor

Date

---



# SPECIFICATIONS

for

**A New Hampton Inn**

in

**Flowood, Mississippi**

OWNER:

Southern Hospitality Services, LLC  
84 Grandview Circle  
Brandon, MS 39047  
(601) 829-9898

ARCHITECT:



**RICHARD F. STELDT**  
NCARB REGISTERED ARCHITECT

ARCHITECTURE ENERGY PLANNING

N85 W16058 APPLETON AVE.  
MENOMONEE FALLS, WI 53051

262-502-4500  
FAX: 262-502-4510  
E-MAIL: rfsteldt@sbcglobal.net

Date: December 7, 2007

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## OWNER'S RESPONSIBILITIES

The following list represents a summary of items which (unless otherwise noted) shall be furnished by Owner.

1. The Owner will select color and décor scheme at a later date.
2. Owner will acquire and install all F.F. & E. for this project.
3. Owner will provide Builders Risk Insurance.
4. No performance bond is required on this project.
5. Owner will provide vendor and telephone system for this project. Telephone outlets are "plaster ring" location by the Electrical Contractor only.
6. Owner to coordinate permits and provide exterior building and free standing signs by separate vendor.
7. Electric company service charges. (Temporary service by General Contractor)
8. Television antennas and wiring the system Owner installed (Electrical Contractor will supply and install plaster rings as shown on electrical plan). If the telephone or television system is to be run in conduit, the Electrical Contractor shall provide.
9. All signage in buildings and installation.
10. Carpet, pad, vinyl and vinyl base installation (coordinate installation with Owner: General Contractor to supervise).
11. Laundry equipment/washers and dryers (Laundry Equipment Supplier Installed). (General Contractor to unload and secure units).
12. Fabric or wall vinyl coverings. (Contractor to install).
13. Entry mats: Furnished and installed by Owner.
14. Owner to pay for cost of building permit as well as all sub-contractor trade permit fees.
15. Owner to pay for cost (if any) of building permit and occupancy permit fees.
16. Any temporary heating and or building "tenting" will be paid for by the Owner.

In the event a discrepancy exists between this list and the plans and specifications, contact the Owner for verification.

### GENERAL CONTRACTOR'S RESPONSIBILITIES

1. General Contractor to include any and all sewer or water, connection or use fees.
2. General Contractor to include any consumption charges for water or electricity for start up, and work progress during construction until the date of occupancy.
3. General Contractor to include any power company charges to bring power to the project pad mount transformer.
4. General Contractor to include installation of phone, antenna and data port "plaster rings" and coordinate with Owner's vendors for each system.
5. Concrete and soil tests (after excavation) are to be included in General Contractor's bid.
6. Fire extinguishers as noted on plans or required by local authorities are to be part of General Contractor's bid.
7. All smoke detection devices shown on plans or required by applicable codes shall be included in General Contractor's bid.
8. Handicap signs as required for parking spaces shall be included in General Contractor's bid.
9. General Contractor to help unload and connect Owner provided laundry equipment.
10. Install any wall vinyl specified on plans (furnished by Owner).
11. Provide and install toilet grab bars, paper holders, shower curtain rods, clothes racks, towel bars, robe hooks, door security guards, door stops and door peeps and blocking required as well as headboard and drapery.
12. Provide and install Tesa, Anity, or Ving Security Door Entry System.
13. Furnish and install all P-TAC units.
14. Provide and install guest room entry door sound-stripping.
15. Inspection fee expense from local authorities.

The preceding line items shall be added to the bid form breakdown included in this manual.

## INSTRUCTIONS TO BIDDERS

INTRODUCTION

Southern Hospitality Services, LLC ("Owner") proposes to build and complete a Hampton Inn as located on the drawings. The work shall include all site work, demolition, construction, etc. as described in the Contract Documents.

GENERAL REQUIREMENTS

All Contract Documents form a part of each section of these Specifications. No allowances will be made for errors or negligence in this behalf.

QUESTIONS AND ANSWERS

Submit all questions regarding discrepancies and omissions to the Architect prior to the date of the Construction Contract. Replies will be provided in written addendum form. All addenda shall be made a part of the Contract. **In the event a discrepancy is discovered after the Construction Contract is executed, the resolution will be made by the Contractor furnishing at no additional expense to the Owner the greater quantity, size, better material, etc. as determined by the Architect.**

ISSUING DOCUMENTS

Bidding Documents will be issued to invited Contractors only.

Requests for additional prints and information required by Sub-contractors shall be made by these Sub-contractors to the Contractor (i.e., Bidder) who, in turn, will contact the Owner.

Additional documents will be provided to invited Contractors only at the cost of printing, directly from the printing company.

RETURNING DOCUMENTS

All Contract Documents must be returned to the Owner's office within ten (10) days after notification of award of a Contract.

PHONE CALLS & PROPER CONTACTS

Questions relating to bidding, alternates, general project status or on obtaining copies of the plans and specifications should be directed to the Owner:

Southern Hospitality Services, LLC  
Phone: (601) 829-9898 FAX: (601) 829-9922

Questions relating to the plans should be directed to the Architect:

Richard F. Steldt  
Phone: (262) 502-4500 FAX: (262) 502-4510  
Email: rfsteldt@sbcglobal.net

IB-2

### BIDDING PROCEDURE AND SUBMISSION OF BIDS

The Owner will schedule the time and place the bids are to be received.

### AWARD OF CONTRACT

The Owner reserves the right to refuse any and all bids.

### SUBSTITUTIONS

No substitutions of materials or equipment shall be accepted except for items designated in the Specifications.

### TYPE OF CONTRACT

Contract Form will be A111 with Guaranteed Maximum Price and shared savings.

### SITE

All Contractors shall visit the site and acquaint themselves with access, site conditions, etc. No consideration will be given to any claims resulting from lack of knowledge of site conditions.

### DOCUMENTS REQUIRED FOR EXECUTION OF CONTRACT

The Owner will prepare The Standard Form of Agreement Between Owner and Contractor (A111) with guaranteed maximum for signature. All successful Bidders must submit, in triplicate, properly executed copies of the Certificate of Insurance (Accord 25) and Schedules of Values on bid form provided. Contracts will be executed only after these items are properly assembled.

### DOCUMENT A201

General Conditions of the Contract for Construction (AIA Document A-201) 1987 ed. with rider are hereby made part of these Construction Specifications. Owner will supply copies at contract execution.

## Article 9 - Supplementary Instructions

- 9.1 The General Contractor is responsible for on-site day-to-day dealings with the supervision of the Sub-contractors relating to pace of job, quality of workmanship and thoroughness. In that regard, the job superintendent shall, (a) be on site the same working day, (b) schedule adequate crews to keep pace with the critical path method schedule provided by the Owner, and (c) set up weekly job progress meetings attended by all Contractors. If a Contractor cannot attend a meeting, he shall send a responsible person to attend in his place. It will not be necessary for all of the trades to attend all of the meetings.
- 9.2 If any Contractor fails to provide materials, equipment, or manpower to maintain the schedule, in the opinion of the Architect, a certified notice shall be sent to the Contractor. If the Contractor does not comply with the request to maintain the schedule within 48 hours (two working days), the Owner shall have the right to provide materials and hire equipment or manpower as the Owner deems necessary to get back on schedule. The Owner shall backcharge the Contractor for the actual costs and deduct the costs from the Contractor's contract amount. Acceptance of this contract is certification by this Contractor that the required materials and manpower are available to perform the work in accordance with the schedule.
- 9.3 The General Contractor will make available a fax machine, on a separate line, at the job site to expedite communications between the parties. The job phone is the responsibility of the General Contractor as well as a pay phone to be located outside the job trailer office.
- 9.4 The General Contractor is responsible for hiring a surveyor to handle all locations of light bases, grades, etc., which will be a reimbursable expense to be established by Owner. In addition, the General Contractor shall also be responsible for soil compaction, concrete and mortar tests as part of the above-mentioned reimbursable fee. However, even though the Owner will reimburse the General Contractor for this work up to an agreed upon fee as stated in the contract, the responsibility lies with the General Contractor to provide the exact locations and grades.
- 9.5 The Contractor will use his best efforts not to use any labor that might unlawfully interfere with other labor or might cause a cessation of work.
- 9.6 Owner to pay for LP gas or natural gas used for Contractor use. Heaters to be supplied by Contractor.
- 9.7 Please be advised that trucks are not to back up underneath the canopy due to the potential for damage to the structure. A policy of roping off/barricading the canopy areas should be implemented immediately upon the commencement of construction and should remain roped off/barricaded until the project has been completed.
- 9.8
  1. The job superintendent must maintain daily logs and take weekly photographs showing the progress of the work. These logs must be faxed to the Owner's construction office daily. The project progress file will be verified for currency prior to the processing of an Application for Payment. Photos should be sent at this time.

2. Owner will supply free of charge five (5) sets of plans and specifications. Five sets of any revised sheets will also be provided free of charge. If additional sets are requested the contractor will pay for extra printing expenses. Questions relating to Owner's plans and specifications which the Job Superintendent cannot answer should be referred to the office of the Owner.
3. Prior to the retention release, Southern Hospitality Services, LLC's GUARANTEE statement must be signed, Contractor's material and test certificate for sprinkler work must be submitted to Owner, and General Contractor must attest to the completion of the fire alarm system.
4. The job is to be maintained in a broom clean condition as work progresses, to the satisfaction of the Owner, on a daily basis. A covered non-combustible waste container shall be provided on each floor.
5. In an effort to maintain the building under construction in broom clean condition during final finishing, the General Contractor shall post "NO SMOKING" signs inside the building and on the exterior entrance doors when the carpet is being installed. A No Smoking and No Eating Policy will be in effect for the remainder of the project and shall be enforced by the Job Superintendent. In addition, after the portable toilets are removed from the site, there will be one restroom in the building designated for toilet facilities, and will be available for construction personnel into the pre-opening period. The Job Superintendent will be responsible for seeing that these policies are adhered to. Contractor shall refer to the technical specifications sections for any particular requirements concerning cleaning up pertaining to the work included hereunder.
6. Without limiting the generality of the contract documents, it is specifically understood and agreed that the scope of work for this agreement includes, but is not limited to the following:
  - A. The Contractor shall be responsible for obtaining all licenses, inspection and/or coordination of and for the City and State required for the performance of this contract. The general building permit and plan check fees will be paid by the Owner.
  - B. This Contractor will be responsible for all material and equipment as required to complete this work.
  - C. This Contractor shall coordinate his work with all trades affected by his work and shall be fully cognizant of the requirements as pertains to his work.
  - D. The contract price hereinafter set forth includes all scaffolding and hoisting required for the performance of the work.
  - E. This Contractor shall lay out his work and shall be responsible for the accuracy thereof



- F. After the installation of the Guest Room entry system, the General Contractor will provide Owner with an Installation Acceptance Statement (a copy of which can be obtained through manufacturer or the Owner). This statement insures proper inspection and installation of the Guest Room entry system by the General Contractor, to manufacturer standards. (Acceptable manufacturers: Tesa, Anity, and Ving)
- G. Installation of the Guest Room entry system will be completed by a trained installer. Options available to the General Contractor to complete this work are available from manufacturer.
- H. Installation of exterior entry systems by Electrical Contractor – entry systems, boxes, (by Owner); rectifiers, electrical strikes transformers (by G.C.); diagram, coordination by Owner, G.C., for Electrical Contractor.

9.9 Contractor agrees to provide Owner with copies of all SIGNED Sub-contracts regarding this project after they are entered into. All such contracts should be supplied to Owner prior to first payment.

9.10 Project Superintendent must maintain a record of the delivery of all fixtures and equipment which Owner orders and delivers to the job site. A file of delivery tickets must be kept on the job for Owner's inspection and should be turned over to Owner at completion of the building. The Contractor's responsibility for all materials and equipment to be incorporated into the building shall extend to include all items provided by Owner and shipped to Contractor. Once receipt of items is acknowledged by Contractor, Contractor is responsible for the safekeeping of the materials or equipment. Contractor is to furnish storage trailer that is water tight and lockable to store Owner furnished items in. This will start 4 months before end of job. The materials and equipment includes, but is not limited to:

All wall vinyl.

Bathroom hardware (toilet paper holders, towel bars, clothes hooks, grab bars, shower curtain rods, showerheads, tissue holders, etc.)

Door hardware (chain guards, peep holes, door stops)

Coat racks for guest rooms

Guest Laundry equipment (washer and dryer)

9.11 Notwithstanding any of the foregoing provisions the parties agree that insurance policies obtained by Owner with respect to Owner's and Contractor's Liability Insurance does not provide coverage for, or name the General Contractor and/or Sub-contractor as an additional insured under such protective insurance policy. Accordingly, it shall be the General Contractor and/or the Sub-contractor's responsibility hereunder to maintain at all times its own Contractor's protective liability insurance and to provide Owner with a certificate of insurance evidencing the existence of such coverage. All losses must be reported to Southern Hospitality Services, LLC (Owner) in writing within seven (7) days.

- 9.12 Contractor shall include a \$75,000 allowance for the pool and spa and their related pumps, filters, heaters and piping.
- 9.13 The General Contractor's Job Superintendent is to verify to the Owner that the job conditions for the erection of the freestanding pylon sign and installation of building letter(s) signage i.e., finish, workmanship quality, cleanliness, etc. is satisfactory prior to the installation and erection of the signs.
- 9.14 It will be the General Contractor's responsibility to thoroughly dehumidify the building interior prior to installation of any wall vinyl and/or building occupancy. Relative humidity conditions prior to the wall vinyl installation shall be below a range of 65 - 70%.
- 9.15 Contractor to coordinate with Owner as to the earliest possible installation of the exterior building flood lights and free standing pylon sign.
- 9.16 Flood lot lights are to be adjusted under the direction of a Hampton Inn representative. This adjusting is to be done after dark at the time the furniture is being placed in the building. Electrician to provide service and equipment.
- 9.17 See page 9/3 for gypsum board certification.

The following addenda supersede any provisions inconsistent therewith contained in the plans, specifications or other contract documents except by separate written agreement executed by Owner and Contractor; these addenda shall also apply to any provisions with which they are not inconsistent:

1. The Contractor, at his own expense, and for the sole contract consideration, notwithstanding any express or implied provisions in plans and /or specifications assigning responsibility to the Owner, shall have sole responsibility for the supplying and performing of everything directly or indirectly necessary or incidental to the complete construction of and equipping the hotel as required by and in accordance with the plans, specifications and other contract documents, except as Owner and Contractor may agree in writing.
2. Owner and Contractor, at Owner's request, prior to subsequent to bid may agree upon a particular source and price thereof for material or equipment to be supplied or work to be performed when such agreement will result in savings or increase in quality.
3. Contractor shall, at the time of execution of the contract, provide Owner with the Mechanic's Lien statute, along with the following forms pursuant to the requirements of the state in which the Owner's project is located: Notice to Owner (if applicable), Lien Claim, Waiver of Mechanics Lien and Satisfaction or Release of Lien, along with the procedures for filing and recording same. Contractor will indemnify and hold Owner harmless and defend Owner against any and all claims of parties arising directly or indirectly out of Contractor's performance of the contract.
4. Contractor shall verify all elevations and ground and site conditions prior to bid. Any discrepancy between actual field conditions and those indicated by the plans, specifications, geotechnical report or other contract documents shall be reported to the Owner and Architect in writing. Failure to make full investigation and report on conditions shall constitute an absolute waiver and acceptance of the actual conditions.
5. Prior to bid, Contractor will thoroughly examine the plans, specifications and other contract documents and report in writing to the Owner and Architect any errors, deficiencies or inconsistencies found therein.
6. Prior to commencement of the work, Contractor shall provide to Owner and Architect a progress schedule insuring the performance and completion of the contract in an orderly and timely manner within the contract time allowed. Extensions of time shall be granted by Owner only for delays caused by weather or general industry conditions beyond the control of the Contractor.
7. Refuse removal of each trade's work is the responsibility of each contractor.

## SCHEDULE C

Requisition for payment shall be submitted **(TO AREA PROJECT SUPERVISORY)** on AIA documents G702 and G703 (Exhibit A and B, attached).

In addition to Request for Payment and Payment Schedule (G702 and G703), Contractors Sworn Statement (Exhibit C) and appropriate Waiver of Liens (Exhibit D or Exhibit E) must be submitted.

The referenced forms are attached hereto and are to be used as "master Copies" for reproduction purposes only. **We do not supply them.**

1. Requisition for Payment (Exhibit "A") shall be submitted by the Contractor.
2. Payment Schedule (Exhibit "B") shall be submitted by the Contractor with each requisition showing percentage of work completed.
3. Contractor's Sworn Statement (Exhibit "C") shall be executed and submitted by the Contractor with each requisition showing all of his sub-contractors and principal suppliers along with the status of their payments.
4. Partial Waiver of Lien (Exhibit "D") shall be executed by the Contractor as well as his sub-contractor(s) in the amount of each payment, and submitted with each requisition.
5. Final Waiver of Lien (Exhibit "E") shall be executed by the Contractor, as well as his sub-contractor(s) in the total amount of the Contract invoicing at the time of final acceptance, and submitted with the final requisition.

**ALL ABOVE DOCUMENTS (EXHIBITS A, B, C, D, AND E) MUST BE SUBMITTED IN TYPEWRITTEN FORM.**

## PARTIAL WAIVER OF LIEN

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by (A) \_\_\_\_\_

\_\_\_\_\_ to furnish labor and/or materials (strike the inapplicable word labor or word materials if not in your contract) for the following improvements (B) \_\_\_\_\_

\_\_\_\_\_ under a contract dated \_\_\_\_\_, numbered \_\_\_\_\_ to the premises described as (C) \_\_\_\_\_

\_\_\_\_\_ in the \_\_\_\_\_ (City, Village) of \_\_\_\_\_

County of \_\_\_\_\_, State of \_\_\_\_\_

of which \_\_\_\_\_

\_\_\_\_\_ is the Owner.

NOW, THEREFORE, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for and in consideration of the sum of (D) \_\_\_\_\_ Dollars to be paid by \_\_\_\_\_ upon submittal of this Partial Waiver of Lien, the undersigned does hereby waive and release any lien rights to, or claim of lien with respect to and on said above described premises, and the improvements hereon, and on the moneys or other consideration due or to become due from the Owner, on account of labor services, materials, fixtures, apparatus or machinery heretofore furnished by the undersigned to or for the above described premises by virtue of said contract.

(E) \_\_\_\_\_ (SEAL)  
(Print Name of Owner, Corporation or Partnership)

(Affix corporate seal here)

\_\_\_\_\_ (SEAL)  
(Signature of Authorized Representative)

TITLE: \_\_\_\_\_

### INSTRUCTIONS FOR A PARTIAL WAIVER:

- (A) Name person or firm with whom you agree to furnish either labor, or services, or materials, or both.
- (B) If you have more than one contact on the same premises, furnish an accurate description of the improvement.
- (C) Describe the location of the premises, by full address or in a manner to distinguish it from other property.
- (D) Amount shown should be the amount submitted on that date.
- (E) If waiver is for a corporation, corporate name should be used, corporate seal affixed and title of officer signing waiver should be set forth; if waiver is for a partnership, the partnership name should be used, a general partner should sign and designate himself partner.

## FINAL WAIVER OF LIEN

To All Whom It May Concern:

WHEREAS, the undersigned has been employed by (A) \_\_\_\_\_

to furnish labor and/or materials (strike the inapplicable word labor or word materials if not in your contract) for the following improvements (B) \_\_\_\_\_

under a contract dated \_\_\_\_\_, numbered \_\_\_\_\_ to the premises described as (C) \_\_\_\_\_

in the \_\_\_\_\_ (City, Village) of \_\_\_\_\_  
County of \_\_\_\_\_, State of \_\_\_\_\_  
of which \_\_\_\_\_

\_\_\_\_\_ is the Owner.

NOW, THEREFORE, this \_\_\_\_\_ day of \_\_\_\_\_,  
20\_\_\_\_, for and in consideration of the sum of (D)  
\_\_\_\_\_ Dollars to be paid by \_\_\_\_\_

upon submittal of this Final Waiver of Lien, the undersigned does hereby waive and release any lien rights to, or claim of lien with respect to and on said above described premises, and the improvements hereon, and on the moneys or other consideration due or to become due from the Owner, on account of labor services, materials, fixtures, apparatus or machinery heretofore furnished by the undersigned to or for the above described premises by virtue of said contract.

(E) \_\_\_\_\_ (SEAL)  
(Print Name of Owner, Corporation or Partnership)

(Affix corporate seal here)

\_\_\_\_\_  
(Signature of Authorized Representative) (SEAL)

TITLE: \_\_\_\_\_

### INSTRUCTIONS FOR A FINAL WAIVER:

- (A) Name person or firm with whom you agree to furnish either labor, or services, or materials, or both.
- (B) If you have more than one contact on the same premises, furnish an accurate description of the improvement.
- (C) Describe the location of the premises, by full address or in a manner to distinguish it from other property.
- (D) Amount shown should be the amount submitted on that date.
- (E) If waiver is for a corporation, corporate name should be used, corporate seal affixed and title of officer signing waiver should be set forth; if waiver is for a partnership, the partnership name should be used, a general partner should sign and designate himself partner.

# **BID FORM** **HAMPTON INN** **FLOWOOD, MS**

General Contractor: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_

Type of Building: \_\_\_\_\_ # of Rooms: \_\_\_\_\_

| SCOPE OF WORK            | Original Bid | Revisions |
|--------------------------|--------------|-----------|
| <b>SITE WORK</b>         |              |           |
| EXCAVATING AND GRADING   |              |           |
| PAVING                   |              |           |
| LANDSCAPE                | Owner        |           |
| IRRIGATION/SPRINKLER     | Owner        |           |
| RETAINING WALLS (IF ANY) |              |           |
| SITE CONCRETE            |              |           |
| SITE ELECTRIC            |              |           |
| SITE PLUMBING            |              |           |
| <b>TOTAL SITE:</b>       |              |           |

|                              |  |  |
|------------------------------|--|--|
| <b>BUILDING CONSTRUCTION</b> |  |  |
| ACOUSTIC TILE                |  |  |
| CARPENTRY/LUMBER             |  |  |
| CARPENTRY/RGH. LABOR         |  |  |
| CARPENTRY/TRUSSES            |  |  |
| CARPET ALLOWANCE             |  |  |
| CERAMIC TILE                 |  |  |
| CONCRETE/TOPPING             |  |  |
| ELECTRICAL                   |  |  |
| ELEVATOR                     |  |  |
| EXTERIOR SKIN                |  |  |
| FIRE PROTECTION              |  |  |
| GLASS/MIRROR                 |  |  |
| GLASS/WINDOWS                |  |  |
| GYPSUM BOARD/METAL STUDS     |  |  |
| HARDWARE                     |  |  |
| HOLLOW METAL                 |  |  |
| HVAC SYSTEM                  |  |  |
| INSULATION                   |  |  |
| MASONRY/BRICK                |  |  |
| METALS                       |  |  |
| MILLWORK/DOORS               |  |  |
| MILLWORK/OTHER               |  |  |
| MILLWORK/PLASTIC             |  |  |
| PAINT & DEC.                 |  |  |
| PLUMBING                     |  |  |
| POOL ALLOWANCE               |  |  |
| RESILIENT FLOORS             |  |  |
| ROOF SYSTEM                  |  |  |
| SEALANTS                     |  |  |
| SPECIAL TIES/FIRE. CAB       |  |  |
| CONTINGENCY                  |  |  |
| GENERAL REQUIREMENTS         |  |  |
| CONTRACTOR O & P             |  |  |
| <b>BASIC TOTALS:</b>         |  |  |

PROJECT TOTAL (G.M.A.): \_\_\_\_\_

THE ABOVE PRICE INCLUDES ALL STATE AND LOCAL TAXES

All contractors awarded divisions on this project will be required to thoroughly clean up after themselves. If any contractor fails to comply, all clean-up expenses incurred by the Owner will be backcharged to the contractor(s) responsibility.



**DIVISION 1 GENERAL REQUIREMENTS****SECTION 01010. SUMMARY OF THE WORK**

- A. Except as otherwise specifically stated in the Contract Documents, each Contractor shall provide and pay for all materials, labor, tools, equipment, heat, transportation, superintendence and temporary construction of every nature whatsoever necessary to execute, complete and deliver all of the work as specified.
- B. The work comprises the complete construction including site work and all appurtenant and incidental work shown, specified and required.
- C. The work shall specifically include the complete restoration of any improvements damaged in connection with the work.

**SECTION 01011. LOCATION OF THE WORK**

The location of the work is on the property as shown on the Drawings.

The detailed location of the work of this project is as shown on the Drawings.

**SECTION 01016. COORDINATION OF THE WORK**

- A. Each Contractor shall be responsible for coordinating the work of all sub-contractors employed by him on the job and shall cooperate with all other Contractors on the project.

**SECTION 01017. LAYING OUT THE WORK**

- A. The Architect or Surveyor will furnish general reference data consisting of one bench mark at project site.
- B. Except for the general reference data furnished by the Architect, each Contractor shall lay out his own work and shall be responsible for all lines, elevations, measurements, placement of work on site and other work executed by him under the Contract. He must exercise proper precaution to verify the figures shown on the Drawings before laying out the work and will be held responsible for any errors resulting from his failure to exercise such precaution.
- C. Final building staking and grade elevation staking shall be done by an independent licensed surveyor hired by the Owner, who is to provide a verification report after the work is completed.

**SECTION 01300. SUBMITTALS**

- A. Submit items and materials as specified in other DIVISIONS of these Specifications.

**SECTION 01301. SHOP DRAWINGS AND SAMPLES**

- A. The Contractor shall submit Shop Drawings and Samples in accordance with the provisions of ARTICLE 4 of the GENERAL CONDITIONS of these specifications. **Product sample is to be approved by Owner prior to ordering for installation**, this includes samples of the following: paint for exterior siding, interior paint, texture, and tile.
- B. Five (5) sets of Shop Drawings are required for the following disciplines:
- Structural Steel
  - Metal Roof Trusses, Floor Trusses
  - Elevator
  - Electrical and Plumbing Fixtures and Equipment
  - Storefront
  - HVAC Equipment
  - Front Desk Cabinetry and All Millwork
- Four (4) sets of millwork shop drawings with current finish schedule are required to be sent to Owner and approval received before fabrication.
- Fire Protection System (Sprinklers)
  - Fire Alarm System
- C. No work shall be fabricated until acceptance of Shop Drawings and/or Schedules and Samples is obtained.
- D. Allow seven (7) working days for review of millwork shop drawings from date of receipt of drawings by Owner.
- E. Shop drawings and samples shall be submitted through the Owner to the Architect for review by the Contractor as directed by each trade section.
- F. Five (5) copies of each required shop drawing or sample shall be submitted to the Owner to be passed on to the Architect. The Architect shall review for general design and project scope only and return four (4) copies to the Owner, one (1) for his records and three (3) to be returned to the Contractor.
- G. Shop drawings and samples shall be submitted to the Architect through the Owner's office in a timely manner so as not to affect the Construction Schedule.
- H. Submittals or shop drawings which contain insufficient data or are unchecked by the Contractor will be returned for correction without further checking by the Architect.
- I. The shop drawing review process does not in any way take precedence over the contract drawings. Any substitutions or deviations from the original plans and specifications must have specific written acceptance by Owner or Architect.

**SECTION 01302. SCHEDULE OF VALUES AND INSURANCE FORM**

- A. Three (3) copies of the Schedule of Values (G703), and Insurance Form (Accord 25), shall be submitted to the Owner for review.

**SECTION 01500. TEMPORARY FACILITIES AND CONTROLS**

- A. Contractor shall provide temporary facilities and controls as specified and required.

**SECTION 01501. UTILITIES**

- A. Electrical Power and Lights. The Contractor shall make the necessary applications for any temporary service. He shall install and pay for all temporary wiring, furnish all bulbs necessary for his use, and he shall remove temporary material upon conclusion of its use. Owner shall pay for consumption. See 01010. A and 16400-4.
- B. Temporary Toilet Facilities. The Contractor shall provide, install and maintain adequate temporary toilet facilities, with enclosures, for the workmen employed on the project from the beginning of construction to such time as the permanent facilities may be available. If the temporary toilet facilities are not connected to municipal utilities, they shall be of the chemical type and shall be placed and maintained as required by the local health ordinances in a sanitary condition, with contents removed from the premises as often as required.

**SECTION 01502. BARRIERS**

- A. The Contractor shall erect temporary barriers to protect work and to prevent injury to persons. Take precautions to discourage access to the work by unauthorized personnel.

**SECTION 01600. MATERIAL AND EQUIPMENT**

- A. Protect materials and equipment from the elements and from damage resulting from construction operations. Store and protect concrete and mortar aggregate to prevent mixture of aggregates and to prevent intrusion of foreign materials.

**SECTION 01711. PROJECT CLOSE-OUT**

- A. The Contractor shall follow the procedures specified in closing out his work, pages 1/7 - 1/8.

**SECTION 01701. CLEANING UP, (SEE PAGE 1/8)**

- A. The Contractor shall remove boxes, crating, rubbish, etc. resulting from his work. Remove labels and marking from fixtures and equipment. Clean fixtures such as plumbing fixtures, lighting fixtures, etc. All materials removed shall be disposed of away from premises. Wash windows, clean laminates, A/C units doors, frames, hardware, mirrors, accessories, clothes racks, ceramic tile and base. The rooms are to be punched out, cleaned up and ready for carpet installer hired by Owner so that this contractor is totally responsible for his clean up and vacuuming of carpeting.

**SECTION 01702. GUARANTEES**

- A. Contractor shall guarantee materials and workmanship for a period of one (1) year in accordance with ARTICLE 13 of the GENERAL CONDITIONS. Contractor shall guarantee certain items for longer periods as specified in other DIVISIONS of these specifications.

**SECTION 01704. OPERATION AND MAINTENANCE DATA**

- A. Contractor shall furnish operation and maintenance data and/or manuals for equipment items as specified in other DIVISIONS of these Specifications.

**SECTION 01705. FOR OWNER'S USE: ADDITIONAL ITEMS TO BE INCLUDED IN BASE BID**

- \* 2 HVAC typical P-TAK units (see HVAC section)
- \* 4 full packages of corridor ceiling tile
- \* 4 pieces of 2 x 2 ceiling tile for Meeting Rooms and corridors
- \* 2 full boxes each of lobby tile and bathroom tile (and any other tile used on project)
- \* 1 full carton each of resilient flooring used
- \* 20 linear feet of vinyl base
- \* 5 gallons interior wall/ceiling paint
- \* 1 gallon each of the miscellaneous paints used on the project
- \* 5% of wall covering used on project

**SECTION 01100. SPECIAL PROJECT PROCEDURES**

**PART 1. GENERAL**

**1.01 EXAMINATION OF SITE BEFORE STARTING WORK**

- A. Before submitting proposal or starting any work, a careful examination of the premises shall be made by all Contractors.

**1.02 ENVIRONMENTAL PROTECTION**

- A. Contractor shall comply with all requirements of Occupational Safety and Health Act, and applicable Federal, State, and Local environmental protection standards.
- B. Solid, liquid, and gaseous contaminants:
1. Contractors shall be responsible for proper disposal of all solid contaminants in accordance with all applicable codes and regulations.
  2. Gaseous contaminants shall be discharged in such a manner that they will be sufficiently diluted with fresh air that the toxicity will be reduced to a level acceptable to the Owner.
  3. Liquid contaminants may, subject to local standards, be diluted with water to a level of quality acceptable in the local sewer system and shall be contained in approved vessels for disposal at approved sites.

- C. Equipment producing noise levels in excess of the allowable levels will not be permitted to be operated on the site.
- D. Contractor shall comply with all applicable laws, ordinances and regulations relative to noise control.
- E. The Owner may temporarily suspend a portion of the work if he determines that such is disruptive to ordinary operations even though noise may be below specified levels. Such a temporary suspension shall not be grounds for additional compensation by the Contractor.

#### 1.03 PROJECT SAFETY

##### A. General Requirements:

1. Each Contractor shall be responsible to maintain comprehensive Safety Program tailored to the specific work items in his work.

##### B. Special Requirements:

1. Each Contractor shall furnish to the Owner, the name, address, and phone number of Supervisor who shall be available on short notice to respond to emergencies during non-working hours caused by or occurring in the work of his trade. The names received will be placed on an "emergency call list" for the use by the Owner. Contractor shall insure that his input to the list is accurate and current.
2. The Contractor shall furnish and maintain fire extinguishers of sufficient type and number to comply with the Occupational Safety and Health Act 29CFR Part 1926.150(c)(1).

#### 1.04 INSTALLATION OF OWNER'S EQUIPMENT

- A. The Owner reserves the right, whenever building is sufficiently completed, to make it feasible to go into any part thereof, to place and install any equipment which is characteristic or incidental to this type of building. The work will be performed so as to interfere as little as practicable with Contractor's work in completing structure. Contractor agrees that placing and installing such equipment does not in any way indicate completion of acceptance of any portion of his work.
- B. Owner reserves the right to do any work incidental hereto without invalidating Contract terms.

### **SECTION 01300. CONSTRUCTION SCHEDULE**

#### **PART 1. GENERAL**

##### **1.01 CONSTRUCTION SCHEDULE**

- A. Upon awarding of the contract, the General Contractor shall submit within 30 days a Construction Schedule detailing the work by category for the period of time stated in the contract. This schedule will be reviewed by the Owner for acceptance or suggested modification for the completion of the work within the time period and the subsequent opening of the Inn.

After the roof is on the building and the windows are in place, the Owner will formulate a detailed Finish Schedule with the approval of the General Contractor to compliment his Construction Schedule. The objective is to have carpeting, F F & E be on schedule to avoid delay of opening and obtaining the Certificate of Occupancy.

## **SECTION 01500. CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

### **PART 1. GENERAL**

#### **1.01 TEMPORARY UTILITY SERVICE**

- A. Plumbing Trades Contractor shall provide and maintain temporary water service at project site for the use of all Contractors, at location and in a manner acceptable to local water department. Owner shall pay for cost of water only. Any fees charged for the temporary service are to be paid by the Plumbing Contractor.
- B. Electrical Trades Contractor shall provide and maintain temporary electrical service at project site for the use of all Contractors, in a manner approved by the local power company and OSHA. Owner shall pay for cost of power only. Any fees charged for the temporary service are to be paid by the Electrical Contractor.

#### **1.02 TEMPORARY HEAT AND VENTILATION**

- A. General Contractor shall provide and maintain temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate the progress of the Project for all Contractors, to meet specific minimum conditions for the installation and proper curing of all materials, and to protect materials and finishes from damage due to temperature or humidity. He shall provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases. Owner shall pay cost of fuel consumed only, if required. See 01010 A.

#### **1.03 FIELD OFFICES AND SHEDS**

- A. Each Contractor shall provide his own office and sheds or trailers at a location on site approved by the Owner.

#### **1.04 PROJECT SIGNS**

- A. A project identification sign shall be supplied by the Owner and installed by the Contractor. No other project signs of any nature shall be allowed.

#### **1.05 TEMPORARY FACILITY REMOVAL**

- A. All temporary facilities noted in this section shall be completely removed from the Project Site prior to substantial completion.

**SECTION 01700. CONTRACT CLOSE-OUT****PART 1. GENERAL (See 01711, Page 1/3)****1.01 CONDITIONS OF CONTRACT CLOSE-OUT**

- A. Contract Close-out shall occur only after the Owner's and Architect's project completion lists have been complied with. The date of substantial completion will occur after the work is complete or the day of occupancy, whichever is later.
- B. After the work is declared "Substantially Complete", the following items must be completed and/or submitted to the Owner before final payment can be made:
  - Record Drawings
  - Waiver and Release of Lien
  - Operating and Maintenance Manuals
  - Operating and Maintenance Instructions
  - Air Balance Report of HVAC Systems
  - Final Cleaning

**1.02 RECORD DRAWINGS**

- A. Contractor shall maintain one (1) "clean" set of drawings recording all field deviations from Contract Drawings in red pencil. This set shall be turned over to the Owner during Contract Close-out.
- B. Exact locations of all service mains, underground work, manholes, field changes, etc. shall be shown on record drawings.

**1.03 WAIVER AND RELEASE OF LIEN**

- A. Contractor shall submit two (2) completed and notarized Waiver and Release of Lien forms using the form attached.

**1.04 OPERATING AND MAINTENANCE MANUALS**

- A. Contractor shall submit two (2) Operating and Maintenance Manuals for each piece of equipment installed.

**1.05 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. Contractor shall provide operating and maintenance instructions to the Owner.

**1.06 FINAL CLEANING (See 01701, Page 1/3)**

- A. Besides general broom cleaning, Contractors shall provide all special cleaning for their trades at completion of their work to insure that all equipment is in clean, safe, working order.

1/8

#### 1.07 FINAL INSPECTION

- A. When all phases of the work are substantially completed, the Contractor shall notify the Architect or Owner in writing that work will be ready for his final inspection on a definite date stated in such notice. Give notice at least ten (10) days in advance of such date to Architect. The Owner's representative will schedule the time that all items on the completion lists are to be finished.

1.08

- A. Provide Fire Alarm certificate.

1.09

- A. Roof warranty.

1.10

- A. Anity (Tesa or Ving) certificate and warranty.

1.11

- A. Have General Contractor sign off in writing as to the accuracy of the sub-contractors who were employed by him to perform various portions of the work so that Owner will have General Contractor's confirm addresses, phone number, and name of contracts.

1.12

- A. Elevator permit.

1.13

- A. Guarantee statement.

1.14

- A. ISO letter on Fire Suppression System.

1.15

- A. Air (HVAC) balance report of all ducted systems per HVAC specifications.



# BURNS COOLEY DENNIS, INC.

## GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

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September 7, 2006

Mr. Roy Patel  
84 Grandview Circle  
Brandon, Mississippi 39047

Report No. 060551

**Geotechnical Investigation  
Comfort Suites and Hampton Inn  
Flowood, Mississippi**

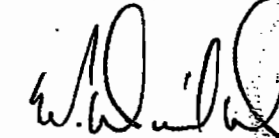
Dear Mr. Patel:

Submitted here is the report of our geotechnical investigation for the above-captioned project. This investigation was authorized by your execution of our contract agreement on July 25, 2006, and was generally performed in accordance with our Proposal No. 06001P-78 dated July 19, 2006.

We appreciate the opportunity to be of service. If you should have any questions concerning this report, please do not hesitate to call us.

Very truly yours,

BURNS COOLEY DENNIS, INC.



W. David Dennis, Jr., P.E.

WDD/gcc

Copies Submitted: (3)

Copy To: Ashish Mishra, AIA, NCARB

RIDGELAND

HATTIESBURG

BILOXI

MEMPHIS

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## **INTRODUCTION AND PURPOSE**

The proposed Comfort Suites and Hampton Inn are to be constructed on a triangular-shaped parcel of land situated east of Old Fannin Road and just north of a shopping center in Flowood, Mississippi. The two hotel facilities will each include a building surrounded by paved drives and parking lots. A site plan showing the building locations and drive and parking lot areas is presented on Figure 1 of this report. Each building will basically consist of a five-story, metal frame structure with exterior brick veneer on the first floor and EIFS on the four floors above. Total dead load plus live load for the building walls will be on the order of 7 kips per ft. Each of the hotel facilities will include a pool. The site for the two hotel facilities is relatively level and wooded.

We conducted a preliminary geotechnical investigation for the site. That investigation is discussed in our Report No. 050850 dated November 4, 2005. Four exploratory soil borings (B-1 through B-4) were made to a depth of 20 ft for the preliminary investigation. Based on examination of the site plan, it appears that the preliminary investigation borings were made within the proposed building areas.

The specific purposes of this investigation were:

- 1) to make additional exploratory soil borings within the areas planned for construction of the hotel buildings, drives and parking lots;
- 2) to verify field classifications and to evaluate pertinent physical properties of the soils encountered in the additional borings by visual examination of the soil samples and testing in the laboratory; and
- 3) after analysis of the preliminary and additional soil boring and laboratory test data, to provide recommendations for site preparation, earthwork construction, and building foundation design and construction, and to also provide guideline recommendations for pavement design and construction.

## **FIELD INVESTIGATION**

Subsurface soil conditions within the areas of planned construction were further explored by means of 14 additional borings (B-5 through B-18). This section of the report provides a

description of drilling and sampling procedures for additional Borings 5 through 18. The approximate locations of all the borings (B-1 through B-18) made within the site are illustrated on Figure 1. The borings were located by means of visual sighting and taped measurements from property corners and existing site features utilizing distances scaled from the site plan we were furnished.

A synopsis of the Unified Soil Classification System is presented on Figure 2 along with symbols and terminology typically utilized on graphical soil boring logs. Graphical logs of all the borings are presented on Figures 3 through 20. The graphical logs illustrate the types of soil encountered with depth below the ground surface at the individual boring locations.

Borings 5 through 18 were made with a tractor-mounted rotary drill rig. Borings 8, 9, 10, 12, 14 and 17 were made within the proposed building areas. Borings 8, 9, 10 and 12 were made to a depth of 20 ft, and Borings 14 and 17 were made to depths of 40 ft and 45 ft, respectively. Borings 5, 6, 7, 11, 13, 15, 16 and 18 were made to a depth of 5 ft within the drive and parking lot areas. The borings were advanced full depth by dry augering. Observations were made continuously during auger drilling to detect free water entering the open boreholes. Notes pertaining to groundwater observations are included at the bottom right corner of the graphic boring logs.

Relatively undisturbed samples of fine-grained soils were obtained at approximate 5-ft intervals of depth in structure Borings 8, 9, 10, 12, 14 and 17 by pushing a 3-in. OD thin-wall Shelby tube sampler approximately 2 ft into the soil. The Shelby tube samples were obtained within the depth intervals illustrated as shaded portions of the "Samples" column of the graphic logs for the structure borings. Disturbed samples of fine-grained soils were obtained at approximate 3-ft intervals of depth in structure Borings 8, 9, 10, 12, 14 and 17 by driving a standard 2-in. OD split-spoon sampler 18 in. into the soil with a 140-lb hammer falling freely a distance of 30 in. The split-spoon samples were obtained within the depth intervals illustrated as crossed rectangular symbols under the "Samples" column of the graphic logs for the structure borings. Standard penetration test (SPT) blow counts resulting from split-spoon sampling are recorded under the "Blows Per Ft" column of the logs for the structure borings. Disturbed auger cutting samples were obtained at approximate 1-ft to 2-ft depth intervals in drive and parking lot Borings 5, 6, 7, 11, 13, 15, 16 and 18, and at selected depths between the split-spoon samples taken in the structure borings. The depths at which the auger cutting samples were taken are

illustrated as small I-shaped symbols under the "Samples" column of the graphic boring logs.

All soils encountered during drilling for Borings 5 through 18 were examined and classified in the field by a geotechnical engineering technician. Each undisturbed Shelby tube sample was extruded from the sampling tube in the field. An approximate 6-in. long portion of each Shelby tube sample was sealed with melted paraffin in a cylindrical cardboard container to prevent moisture loss and structural disturbance. An additional portion of each Shelby tube sample, representative portions of the split-spoon samples, and the auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory.

In compliance with Mississippi Department of Environmental Quality (MDEQ) regulations, the 40-ft and 45-ft deep boreholes for Borings 14 and 17, respectively, were filled with cement-bentonite grout after completion of drilling and sampling. The other boreholes were plugged with soil cuttings.

## LABORATORY INVESTIGATION

All of the soil samples from Borings 5 through 18 were examined in the laboratory and tests were performed on selected samples to verify field classifications and to assist in evaluating the strengths and volume change properties of the soils encountered in the borings. The types of laboratory tests performed are described in the following paragraphs.

The undrained shear strength characteristics of the fine-grained soils encountered in the structure Borings 8, 9, 10, 12, 14 and 17 were investigated by means of 12 unconfined compression tests performed on selected undisturbed Shelby tube samples. The results of the unconfined compression tests in terms of cohesion are plotted as small open circles in the data section of the graphic logs for the structure borings. The water content and dry density were also determined for each unconfined compression test specimen. The water contents are plotted as small shaded circles in the data section of the graphic logs for the structure borings. The dry densities are tabulated to the nearest lb per cu ft under the "Dry Density" column of the structure boring logs.

The classifications and volume change properties of fine-grained soils encountered in Borings 5 through 18 were investigated by means of 17 sets of Atterberg liquid and plastic limit tests. The results of the liquid and plastic limit tests are plotted as small crosses interconnected

by dashed lines in the data section of the graphic logs for Borings 5 through 18. In accordance with the Unified Soil Classification System, fine-grained soils are classified as either clays or silts of low or high plasticity based on the results of liquid and plastic limit tests. The numerical difference between the liquid limit and plastic limit is defined as the plasticity index (PI). The magnitudes of the liquid limit and plasticity index and the proximity of the natural water content to the plastic limit are indicators of the potential for a fine-grained soil to shrink or swell upon changes in moisture content or to consolidate under loading.

Water content tests were performed on 85 samples from Borings 5 through 18 to corroborate field classifications and to extend the usefulness of the strength, plasticity and field SPT data. The results of the water content tests are plotted as small shaded circles in the data section of the graphic boring logs. The water content data have been interconnected on the logs to illustrate a continuous profile with depth.

### GENERAL SOIL CONDITIONS

A general description of subsurface soils encountered in Borings 1 through 18 is provided in the following paragraphs. The graphical logs shown on Figures 3 through 20 should be referred to for specific soil conditions encountered at each boring location. Stick logs of the borings are shown in profile on Figures 21 and 22 to aid in visualizing subsurface conditions. Tabulated adjacent to the stick logs are Atterberg limit and plastic limits, water contents, dry densities, cohesions and field SPT blow counts.

The ground surface at the locations of Borings 2 through 18 was found to be underlain by silty clays (CL). For the most part, the silty clays (CL) were encountered at those boring locations to depths of only about 1.5 ft to 3.5 ft below the surface. At the locations of Borings 2, 13 and 14, the silty clays (CL) were encountered to slightly greater depths of approximately 6 ft, 4 ft and 6 ft, respectively. The silty clays (CL) are classified as very stiff and hard with respect to consistency. The silty clays (CL) are considered to have high strength and low compressibility. Atterberg limit tests performed on six representative samples of the silty clays (CL) yielded liquid limits ranging from 31 to 45, plastic limits that vary between 19 and 21, and plasticity indices that range from 10 to 26. The silty clays (CL) are considered to have low shrink/swell potential. Water contents within the silty clays (CL) are low and several percentage

points below the plastic limit. Therefore, even though the silty clays (CL) have low shrink/swell potential, at their present water contents the silty clays (CL) could still experience swelling upon an increase in moisture content.

The ground surface at the location of Boring 1 and the silty clays (CL) at Borings 2 through 18 were found to be underlain by clays (CH) which are considered to be Terrace soils. The Terrace clays (CH) were encountered to the 5-ft terminal depth of the pavement borings and to depths ranging from about 11 ft to 16 ft at the locations of the structure borings. The Terrace clays (CH) are classified as very stiff and hard and are therefore considered to have high strength and low compressibility. For the most part, the Terrace clays (CH) are slightly silty. Atterberg limit tests performed on representative samples of the Terrace slightly silty clays (CH) yielded liquid limits ranging from 50 to 58, plastic limits that vary between 15 and 20, and plasticity indices that range from 33 to 42. The Terrace slightly silty clays (CH) are considered to be expansive with moderate to high shrink/swell potential. Within some depth intervals, the Terrace clays (CH) are not slightly silty. Atterberg limit tests performed on two representative samples of the Terrace clays (CH) that are not slightly silty yielded liquid limits of 63 and 64, plastic limits of 15 and 17, and plasticity indices of 47 and 48. The Terrace clays (CH) that are not slightly silty are considered to be expansive with high shrink/swell potential. In general, water contents within the Terrace slightly silty clays (CH) and clays (CH) are either at or a few percentage points below the plastic limit. Thus, the Terrace slightly silty clays (CH) and clays (CH) are very susceptible to swelling upon an increase in moisture content.

The Terrace slightly silty clays (CH) and clays (CH) were found at the structure boring locations to be underlain by weathered Yazoo clays (CH). The weathered Yazoo clays (CH) were encountered to the 20-ft terminal depth of structure Borings 1 through 4, 8, 9, 10 and 12. The weathered Yazoo clays (CH) are classified as very stiff and hard with respect to consistency. The weathered Yazoo clays (CH) are considered to have high strength and low compressibility. The weathered Yazoo clays (CH) were found to be slickensided within some depth intervals. Slickensides are randomly oriented microfailure planes within the weathered Yazoo clays (CH) caused by differential shrink/swell movements in the geologic past. Atterberg limit tests performed on two representative samples of the weathered Yazoo clays (CH) yielded liquid limits of 82 and 103, plastic limits of 22 and 28, and plasticity indices of 54 and 81. The weathered Yazoo clays (CH) are expansive with high shrink/swell potential.

At the locations of structure Borings 14 and 17, the weathered Yazoo clays (CH) were found to be underlain by unweathered blue Yazoo clays (CH) at depths of approximately 32 ft and 40 ft, respectively. The unweathered Yazoo clays (CH) are classified as hard and are considered to have high strength and low compressibility. Unconfined compression tests performed on two undisturbed samples of the hard unweathered Yazoo clays (CH) yielded cohesions of 6.69 and 6.81 kips per sq ft. The unweathered Yazoo clays (CH) are considered to be highly expansive. The unweathered Yazoo clays (CH) were encountered to the 40-ft and 45-ft terminal depths of Borings 14 and 17, respectively.

Free water was not encountered during auger drilling for the borings. Groundwater conditions at the site will primarily be influenced by rainfall, surface drainage, and by the rise and fall of water levels in any nearby ditches, creeks, ponds or other bodies of water. Surficial soils can become saturated and weak to relatively shallow depths during periods of prolonged and heavy rainfall.

## **DISCUSSION AND RECOMMENDATIONS**

Subsurface soils encountered within the 45-ft maximum exploration depth of the borings made within the site for the Comfort Suites and Hampton Inn generally include silty clays (CL) underlain by Terrace slightly silty clays (CH) and clays (CH) that are underlain in turn by weathered and unweathered Yazoo clays (CH). The subsurface soils encountered in the borings are classified as very stiff and hard with respect to consistency and are therefore considered to have high strength and low compressibility. For the most part, the silty clays (CL) were encountered to relatively shallow depths of about 1.5 ft to 3.5 ft below the surface. At three of the boring locations, the silty clays (CL) were encountered to slightly greater depths of about 4 ft and 6 ft. The silty clays (CL) are considered to have low shrink/swell potential; however, water contents within the silty clays (CL) are several percentage points below the plastic limit, so they are susceptible to some swelling upon an increase in moisture content. The Terrace clays (CH) that are slightly silty are considered to be expansive with moderate to high shrink/swell potential. The Terrace clays (CH) that are not slightly silty are considered to be expansive with high shrink/swell potential. Water contents within the Terrace slightly silty clays (CH) and clays (CH) are generally either at or a few percentage points below the plastic limit; therefore, they are



very susceptible to swelling upon an increase in moisture content. The Yazoo clays (CH) are highly expansive. Weathered Yazoo clays (CH) were encountered at the locations of the structure borings at depths ranging approximately 11 ft to 16 ft below the surface. Unweathered blue Yazoo clays (CH) were encountered at the locations of structure Borings 14 and 17 at depths of approximately 32 ft and 40 ft, respectively.

The surficial silty clays (CL) encountered at the boring locations are considered to have low shrink/swell potential; however at their present low water contents, the silty clays (CL) would experience some swelling upon an increase in moisture content. The moderately to highly expansive Terrace slightly silty clays (CH), the highly expansive Terrace clays (CH) and the highly expansive weathered Yazoo clays (CH) can experience significant shrink/swell movements associated with seasonal moisture content fluctuations. Nonexpansive cover materials overlying expansive clay (CH) soils act as a buffer against seasonal moisture content changes caused by rainy weather, droughts and evapotranspiration. Thus, the potential magnitude of moisture content changes and associated shrink/swell movements within expansive clay (CH) soils is proportionate to the thickness of overlying nonexpansive cover materials. Seasonal moisture content changes and shrink/swell movements within expansive clay (CH) soils decrease as the thickness of cover materials increases. There is a general trend for expansive clay (CH) soils under structures to swell due to an increase in water content caused by capillary and vapor phase movement of moisture within the clays (CH). Expansive clay (CH) soils will also experience considerable swelling if directly supplied with water from rainfall, sprinkler systems, broken underground water and sewer pipes, or any other source. Trees growing adjacent to a structure can extract a considerable amount of moisture from the ground resulting in localized shrinkage of expansive clay (CH) soils accompanied by vertical and lateral movements. Overburden removal associated with the establishment of finished grades lower than existing ground elevations will cause stress relief in expansive clay (CH) soils resulting in long-term rebound. Expansive clay (CH) soils will also experience long-term downhill creep movements, depending on slope steepness.

In our opinion a shallow foundation system could be utilized for support of the hotel buildings, provided column loads are less than 150 kips and wall loads do not exceed 7 kips per ft, and undercutting, backfilling and filling are performed to remove a sufficient thickness of expansive clay (CH) soils to create a minimum 10-ft thick buffer of compacted select low

permeability nonexpansive soil to directly underlie the floor slab and finished outside grades adjacent to the buildings. In addition to the 10-ft thick nonexpansive soil buffer, we recommend that undercutting extend a minimum of 8 ft below the existing ground surface within the construction areas for the hotel buildings to remove near-surface clay (CH) soils that have relatively low water contents and are particularly susceptible to excessive swelling upon an increase in moisture content. Depending on finished grades, this may result in greater than 10 ft of nonexpansive soil buffer materials within some areas. The buffer of nonexpansive soil is intended to minimize differential shrink/swell movements within the buildings caused by seasonal moisture content fluctuations in the expansive clay (CH) soils. We recommend that the buildings be supported by either a stiffened slab-on-grade foundation or a spread footing foundation. It is our opinion that either flexible asphalt concrete or rigid Portland cement concrete pavement can be utilized for the drives and parking lots, provided undercutting, backfilling and filling are performed as required to remove expansive clays (CH) and provide not less than 3 ft of nonexpansive soil below asphalt concrete pavement and not less than 5 ft of nonexpansive soil below Portland cement concrete pavement. Details of our recommendations for site preparation, earthwork construction, and foundation design and construction are included in the following subsections of this report. Guideline pavement design recommendations are also provided.

#### **Site Preparation and Earthwork Construction**

As an initial step of site preparation, trees located throughout the construction area for the buildings, drives and parking lots should be removed, including stumps and roots. Since trees extract considerable moisture from the ground causing horizontal and vertical shrinkage of clay (CH) soils, it would also be prudent to remove any other trees located within 12 trunk diameters of the building areas. Stripping should be performed to a sufficient depth throughout the construction area to remove organic-laden surficial soils, vegetation, debris, brush and roots. Excavation should then be performed to remove any weak soils exposed after stripping. The actual vertical and lateral extent of excavation required to remove weak soils must be determined in the field during earthwork construction. Excavation to remove weak soils should extend laterally not less than 10 ft beyond the building perimeters and not less than 3 ft beyond pavement edges.

Undercutting should be performed within the building areas to remove expansive clays (CH) and provide for the placement of not less than 10 ft of low permeability nonexpansive soil to directly underlie the first floor slab and finished outside grades adjacent to the buildings. As indicated previously, undercutting to remove expansive clays (CH) and create the 10-ft thick nonexpansive soil buffer within the building areas should extend a minimum of 8 ft below existing ground elevations. Undercutting to remove expansive clays (CH) should extend laterally not less than 10 ft beyond the building perimeters. Undercutting as recommended herein for the hotel buildings should also be performed for pools located outside the buildings. Undercutting should be performed as required within the drive and parking lot areas to remove expansive clays (CH) and provide for the placement of not less than 3 ft of nonexpansive soil beneath asphalt concrete pavement and not less than 5 ft of nonexpansive soil beneath Portland cement concrete pavement. Undercutting to remove expansive clays (CH) should extend laterally not less than 3 ft beyond pavement edges. The actual vertical and lateral extent of undercutting required to remove expansive clay (CH) soils within the pavement areas must be determined in the field during earthwork construction.

Relatively strong soils exposed after stripping and excavation of weak materials within drive and parking lot areas where undercutting of expansive clays (CH) is not necessary to create the recommended buffer thicknesses should be scarified to a minimum depth of 6 in. and compacted to not less than 95 percent of standard Proctor maximum dry density (ASTM D 698) with stability present. Alternatively, the exposed soils can be proofrolled to demonstrate stability. Stability is defined as the absence of significant pumping or yielding of soils during compaction or proofrolling. If stability is not evident in some areas, either additional excavation or treatment of the in situ soils with an admixture, or a combination of these approaches, might be required to achieve stable conditions.

It should be noted that silty clays (CL) exposed after stripping and excavation are susceptible to pumping under wet conditions. The construction techniques and types of equipment utilized and site drainage provided during construction will have a great effect on the performance of these soils throughout the project. The routing of heavy rubber-tired equipment should be controlled to minimize, as much as possible, traffic over the site. All traffic should be discouraged during periods of inclement weather. If pumping is initiated in silty clays (CL) as a construction expedient the pumping can be counteracted by treating these materials with hydrated

lime. It is estimated that about 4 to 6 percent hydrated lime by dry weight of soil could be required.

After stripping, excavation, undercutting, scarification/compaction and/or proofrolling have been performed as recommended in the preceding paragraphs, fill materials can be placed to achieve planned grades. Imported fill soils should consist of select, nonorganic and debris-free silty clays (CL) having a plasticity index (PI) within the range of 10 to 24 and a liquid limit less than 45. To be classified as silty clays (CL), the fill materials must have more than 70 percent fines passing the No. 200 sieve. We do not recommend the use of sands (SC, SM or SP) as fill. Fill materials placed within the building areas and within 10 ft of their perimeters should be compacted from lifts not exceeding 9 in. in loose thickness to not less than 98 percent of standard Proctor maximum dry density (ASTM D 698) at moisture contents within 3 percentage points of the optimum water content. Fill materials placed elsewhere on the site should be compacted from maximum 9-in. thick loose lifts to not less than 95 percent of standard Proctor maximum dry density at moisture contents within 3 percentage points of the optimum water content. Stability must be evident during compaction of each lift before any subsequent lifts of fill material are added. As a construction expedient, fill soils that are unstable and/or pumping due to excessive moisture can be treated with hydrated lime in accordance with recommendations given previously for pumping on-site soils. Finished site grades should be sloped to promote quick runoff of storm water away from the buildings and across paved areas.

Laboratory classification tests, including Atterberg limit determinations and grain-size analyses, should be performed on the fill soils initially and routinely during earthwork operations to check for compliance with the recommendations provided herein. Field moisture/density tests should be performed frequently in the scarified and compacted on-site soils and in each compacted lift of fill material to assist in evaluating whether the recommended moisture contents and dry densities are being achieved. As a guide for building earthwork construction, we suggest a minimum of one test per lift for each 2,500 sq ft of surface area or portion thereof. A frequency of testing considered to be appropriate for the pavement areas is one test per lift for each 5,000 sq ft of surface area.

#### **Stiffened Slab-on-Grade Foundation**

The hotel buildings could be supported by a foundation system consisting of a slab-on-grade stiffened with perimeter grade beams, or turned-down edges, and interior grade or tie

beams. Grade beams should be utilized to support all exterior walls and all interior load bearing and partition walls, or otherwise they should be spaced in a grid pattern on not greater than about 15-ft centers in each direction. Any columns should be supported by widened portions of the grade beams. We recommend that grade beams or turned-down edges around the perimeter of the building be brought to bear at a depth not less than 2 ft below lowest adjacent finished outside grades. Interior tie or grade beams should be brought to bear at a depth not less than 1.5 ft below the bottom of the floor slab. We recommend that grade beams be proportioned for critical combinations of dead, live and wind loads utilizing a net allowable soil bearing pressure of 2,500 lbs per sq ft. A net allowable soil bearing pressure of 3,000 lbs per sq ft should be utilized to dimension widened portions of grade beams used to support column loads. We recommend a minimum base width of 12 in. for the grade beams. The grade beams should be reinforced for both positive and negative bending. The floor slab should be reinforced for anticipated loading conditions and deflections and to minimize slab cracking. We recommend that the slab be reinforced with a grid of relatively closely spaced reinforcing bars (i.e., No. 3 or No. 4 bars) in lieu of welded wire fabric. For the stiffened slab and grade beam foundation, on-site soils and earthwork performed as recommended, future differential vertical movements within the buildings resulting from shrinking and swelling of the expansive clay (CH) soils due to seasonal moisture content fluctuations should be less than 3/4 in. over a horizontal distance of 25 ft to 30 ft.

#### **Spread Footing Foundation**

The hotel buildings could alternatively be supported by a spread footing foundation. For this type of foundation, strip footings should be utilized to support all exterior and interior load bearing walls, and columns should be supported by square footings. The footings should be founded directly upon the compacted select fill materials. We recommend that footings around the perimeters of the buildings be brought to bear at a depth not less than 2 ft below lowest adjacent finished outside grades. Interior footings should be brought to bear at a depth not less than 1.5 ft below the bottom of the floor slab. Strip footings should be proportioned for critical combinations of dead, live and wind loads utilizing a net allowable soil bearing pressure of 2,500 lbs per sq ft. We recommend a minimum width of 18 in. for strip footings. A net allowable soil bearing pressure of 3,000 lbs per sq ft should be used to dimension square footings. We

recommend a minimum width of 24 in. for square footings. For the relatively lightly loaded buildings, on-site soils and earthwork performed as recommended, differential movements between adjacent footings should be less than 3/4 in.

The floor slabs of the buildings can bear directly upon the compacted fill materials. The slabs should be adequately reinforced for anticipated loading conditions and deflections and to minimize slab cracking. Stiffening ribs, or grade beams, cast monolithically with the slabs could be utilized to provide rigidity and to support non-load-bearing partition walls.

### **Guideline Pavement Recommendations**

In our opinion, either flexible asphalt concrete or rigid Portland cement concrete pavement can be utilized for the drives and parking lots. Site preparation and earthwork construction should be performed for the drives and parking lots in accordance with the recommendations given previously in this report to provide not less than 3 ft of nonexpansive soil beneath asphalt concrete pavement and not less than 5 ft of nonexpansive soil beneath Portland cement concrete pavement. Guideline pavement recommendations are given in the following paragraphs that represent typical construction practice for lightly loaded automobile and small truck-trafficked drives and parking lots.

For relatively light passenger car and pickup truck traffic, the flexible pavement structure could consist of full-depth asphalt concrete including 4 in. of bituminous base overlain by a 2-in. thick asphalt surface course. A thicker asphalt concrete pavement section should be utilized in areas where the pavement will be subjected to heavy truck traffic. For the heavier loading, a full-depth asphalt concrete pavement structure on the order of 8 in. to 9 in. thick would likely be required. The thicker full-depth asphalt concrete pavement could include a 2-in. thick surface course and a 2-in. binder course with the remainder consisting of bituminous base. The asphalt concrete surface course should conform with all applicable specifications for SC-1, Type 8, presented in the Mississippi Standard Specifications for Road and Bridge Construction (1990 Edition). The binder course and bituminous base should conform with applicable specifications for BC-1, Type 6, and BB-1, Type 6, respectively.

For rigid pavement, it is our opinion that 5 in. of Portland cement concrete (PCC) underlain by a minimum of 4 in. of granular subbase materials would be appropriate for automobile and pickup truck traffic. The subbase is intended to prevent subgrade soils from

pumping up through joints between concrete pavement slabs. The drives and parking lots should be sufficiently elevated to allow drainage of the granular subbase. We recommend that the granular subbase materials conform to the gradation requirements for Class 3 and 4 aggregate presented in the Mississippi Standard Specifications for Road and Bridge Construction (1990 Edition), except the material should have not more than 15 percent fines passing the No. 200 sieve for the total sample. The plasticity characteristics of the aggregate should conform to Group A. Alternatively, No. 610 crushed limestone could be utilized for the granular subbase. The portion of the crushed stone passing the No. 40 sieve should have a liquid limit not greater than 25 and a plasticity index not greater than 5. For heavy truck traffic, PCC pavement with a thickness on the order of 8 in. would likely be required. Portland cement concrete pavement slabs should be constructed in accordance with the latest ACI, ASTM and PCA standards, including thickened exterior edges and corners, and load transfer devices. Pavement slabs should generally be square and have a maximum joint spacing of 10 ft for 5-in. thick and 15 ft for 8-in. thick pavements. The pavement joints should be properly sealed and maintained. The minimum compressive strength of the concrete mixture should be 4,000 lbs per sq in. The surface of the pavement should be crowned and sloped to promote quick runoff of storm water

If rigid Portland cement concrete pavement is not utilized for the drives and parking lots, we still recommend its use immediately in front of any garbage dumpsters to provide support for the wheels of a garbage truck during loading. We recommend that the concrete pavement utilized for this purpose be at least 8 in. thick. If the concrete pavement in front of dumpsters includes joints, we recommend that it be directly underlain by a minimum of 4 in. of granular subbase materials.

In areas to be paved, there is often some delay between completion of earthwork operations and placement of the pavement structure materials, possibly resulting in deterioration of subgrade conditions. Thus, we recommend that the density and stability of the subgrade soils be confirmed or re-established immediately prior to construction of the pavement for the drives and parking lots.

### **Other Design Considerations**

The moderately to highly expansive Terrace slightly silty clays (CH), the highly expansive Terrace clays (CH), and the highly expansive weathered Yazoo clays (CH) which underlie the ground surface at the site will swell considerably if directly supplied with water. If flower and shrub beds including sprinkler systems are placed adjacent to the hotel buildings, the beds should be prepared such that they do not trap water, and sprinklers should be operated only enough to satisfy the water demands of the plants and shrubs. Excessive watering and ponding adjacent to the buildings could result in downward percolation of water to the expansive clays (CH) causing them to swell. Rainwater falling on the roofs of the buildings should be collected and prevented from reaching the ground immediately adjacent to the buildings. Downspouts extending from the roofs should be equipped with extensions at ground level that are sloped to emit collected rainwater not less than 10 ft away from the buildings. The downspouts could be connected to solid discharge pipes buried beneath the ground. We caution that these pipes should be flexible enough to accommodate some differential movement and all pipe connections must be leak free. Trees remove water from the ground by transpiration causing vertical and horizontal shrinkage of clays (CH). To minimize these effects, any trees planted for landscaping purposes should be located at least one-half their anticipated mature height away from the buildings. If the risk of more movement is acceptable, a less strict building-to-tree spacing of about 25 ft for hardwoods and 15 ft for pines could be utilized.

The site of the proposed Comfort Suites and Hampton Inn hotel facilities in Flowood, Mississippi, lies within a relatively low seismic activity region according to the seismic zone mapping referenced in the 2003 International Building Code. Given the site soil profile as revealed by the borings and anticipated for the area based on our experience, a site class D could be used in a seismic load evaluation. Considering the maximum ground motion maps presented in the code and the site class, we recommend utilizing mapped spectral response accelerations of  $F_a = 1.6$  and  $F_v = 2.4$ .



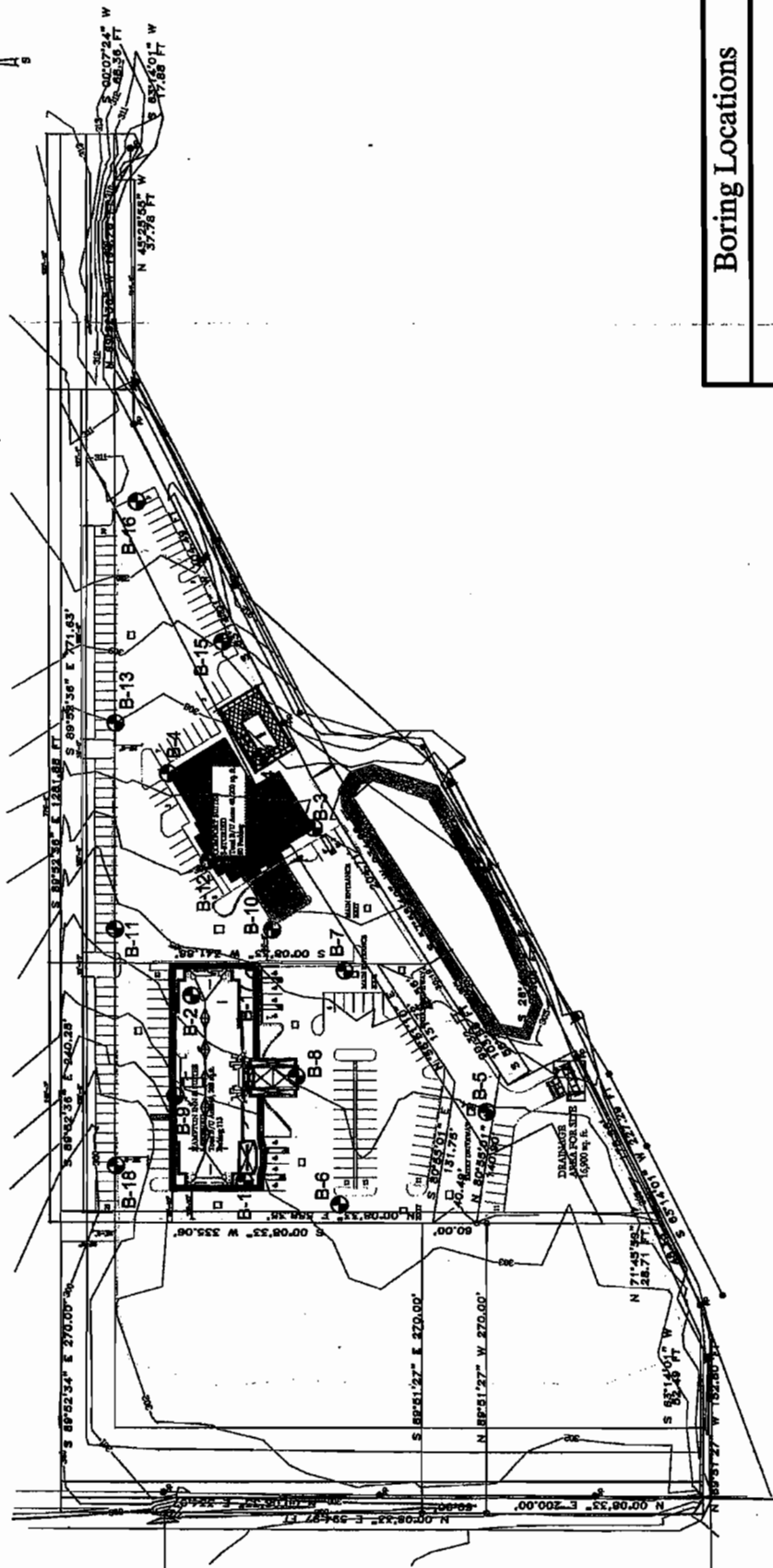
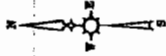
## REPORT LIMITATIONS

The analyses, conclusions and recommendations discussed in this report are based on conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of subsurface conditions throughout the areas investigated. It should be noted that actual subsurface conditions between and beyond the borings might differ from those encountered at the boring locations. If subsurface conditions are encountered during construction that vary from those discussed in this report, Burns Cooley Dennis, Inc., should be notified immediately in order that we may evaluate the effects, if any, on earthwork construction, and foundation and pavement design and construction.

Burns Cooley Dennis, Inc., should be retained for a general review of final design drawings and specifications. It is advised that we be retained to observe earthwork, foundation and pavement construction for the project in order to help confirm that our recommendations are valid or to modify them accordingly. Burns Cooley Dennis, Inc., cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report has been prepared for the exclusive use Mr. Roy Patel for specific application to the geotechnical aspects of design and construction for the proposed Comfort Suites and Hampton Inn hotel facilities to be constructed in Flowood, Mississippi. The only warranty made by us in connection with the services provided is we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended.

## FIGURES



## Boring Locations

COMFORT SUITES AND HAMPTON INN  
FLOWOOD, MISSISSIPPI

BURNS COOLEY DENNIS, INC.  
551 SUNNYBROOK ROAD  
RIDGELAND, MISSISSIPPI 39157

JOB NO. 060551 SCALE: 1"=100' FIGURE 1

# UNIFIED SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS                                                                   |                                                                           |                                                  | SYMBOL & LETTER | DESCRIPTION                                            |  |  |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------|-----------------|--------------------------------------------------------|--|--|
| COARSE-GRAINED SOILS<br>More than half of material larger than No. 200 sieve size | GRAVELS<br>More than half of coarse fraction larger than No. 4 sieve size | Clean Gravels (Little or no fines)               | GW              | WELL GRADED GRAVEL, GRAVEL-SAND MIXTURE                |  |  |
|                                                                                   |                                                                           |                                                  | GP              | POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURE              |  |  |
|                                                                                   |                                                                           | Gravels with fines (Appreciable amount of fines) | GM              | SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURE                 |  |  |
|                                                                                   |                                                                           |                                                  | GC              | CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURE                |  |  |
|                                                                                   | SANDS<br>More than half of coarse fraction smaller than No. 4 sieve size  | Clean Sands (Little or no fines)                 | SW              | WELL GRADED SAND, GRAVELLY SAND                        |  |  |
|                                                                                   |                                                                           |                                                  | SP              | POORLY GRADED SAND, GRAVELLY SAND                      |  |  |
|                                                                                   |                                                                           | Sands with fines (Appreciable amount of fines)   | SM              | SILTY SAND, SAND-SILT MIXTURE                          |  |  |
|                                                                                   |                                                                           |                                                  | SC              | CLAYEY SAND, SAND-CLAY MIXTURE                         |  |  |
| FINE-GRAINED SOILS<br>More than half of material smaller than No. 200 sieve       | SILTS AND CLAYS                                                           | Liquid limit less than 50                        | ML              | SILT WITH LITTLE OR NO PLASTICITY                      |  |  |
|                                                                                   |                                                                           |                                                  | ML              | CLAYEY SILT, SILT WITH SLIGHT TO MEDIUM PLASTICITY     |  |  |
|                                                                                   |                                                                           | Liquid limit greater than 50                     | CL              | SILTY CLAY, LOW TO MEDIUM PLASTICITY                   |  |  |
|                                                                                   |                                                                           |                                                  | CL              | SANDY CLAY, LOW TO MEDIUM PLASTICITY (30% TO 50% SAND) |  |  |
|                                                                                   | SILTS AND CLAYS                                                           | Liquid limit greater than 50                     | MH              | SILT, FINE SANDY OR SILTY SOIL WITH HIGH PLASTICITY    |  |  |
|                                                                                   |                                                                           |                                                  | CH              | CLAY, HIGH PLASTICITY                                  |  |  |
| HIGHLY ORGANIC SOILS                                                              |                                                                           |                                                  | OH              | ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY              |  |  |
|                                                                                   |                                                                           |                                                  | PT              | PEAT, HUMUS, SWAMP SOIL                                |  |  |

## TERMS CHARACTERIZING SOIL STRUCTURE

|              |                                                                                                                                                       |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slickensided | - Clays with polished and striated planes created as a result of volume changes related to shrinking, swelling and/or changes in overburden pressure. |
| Fissured     | - Clays with a blocky or jointed structure generally created by seasonal shrinking and swelling.                                                      |
| Laminated    | - Composed of thin alternating layers of varying color and texture.                                                                                   |
| Calcareous   | - Containing appreciable quantities of calcium carbonate.                                                                                             |
| Parting      | - Paper thin (less than 1/8 inch).                                                                                                                    |
| Seam         | - 1/8 inch to 3 inch thickness.                                                                                                                       |
| Layer        | - Greater than 3 inches in thickness.                                                                                                                 |

## PLASTICITY CHART

FOR CLASSIFICATION OF FINE GRAINED SOILS

## DENSITY AND CONSISTENCY

| COARSE-GRAINED SOILS |                           | FINE-GRAINED SOILS |                      |                           |
|----------------------|---------------------------|--------------------|----------------------|---------------------------|
| DENSITY              | PENETRATION RESISTANCE, N | CONSISTENCY        | COHESION Kips/Sq.Ft. | PENETRATION RESISTANCE, N |
|                      | Blows per Foot            |                    |                      | Blows per Foot            |
| Very loose           | 0 - 4                     | Very Soft          | <0.25                | 0 - 1                     |
| Loose                | 5 - 10                    | Soft               | 0.25 - 0.50          | 2 - 4                     |
| Medium Dense         | 11 - 30                   | Medium Stiff       | 0.50 - 1.00          | 5 - 8                     |
| Dense                | 31 - 50                   | Stiff              | 1.00 - 2.00          | 9 - 15                    |
| Very Dense           | >50                       | Very Stiff         | 2.00 - 4.00          | 16 - 30                   |
|                      |                           | Hard               | >4.00                | >30                       |

## SAMPLE TYPES (Shown in Sample Column)

|  |                  |
|--|------------------|
|  | Shelby Tube      |
|  | Split Spoon      |
|  | No Recovery      |
|  | Auger            |
|  | Dennison Barrell |

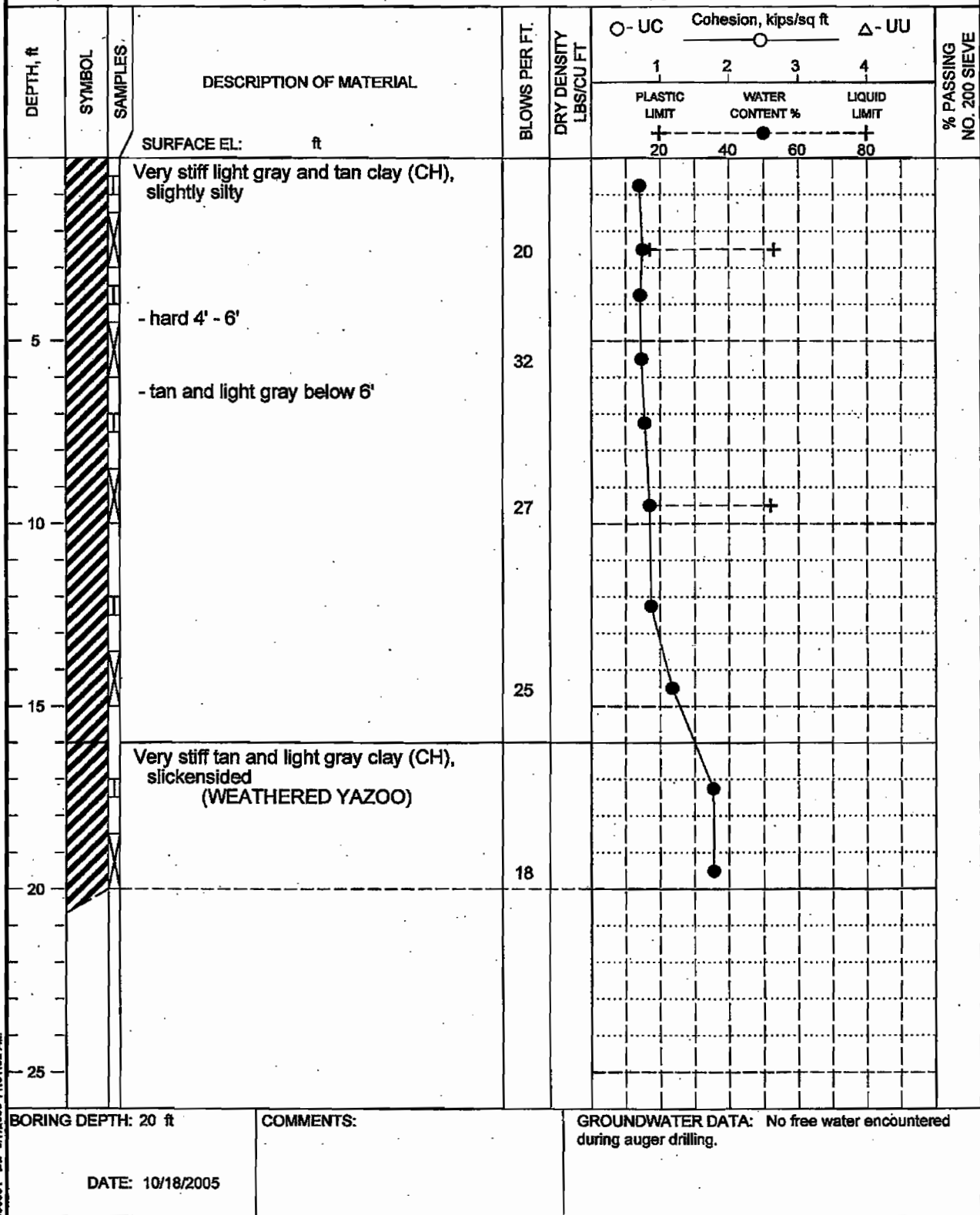
| PARTICLE SIZE IDENTIFICATION |                                 | RELATIVE COMPOSITION |          |
|------------------------------|---------------------------------|----------------------|----------|
| Cobbles                      | - Greater than 3 inches         | Slightly             | 5 - 15%  |
| Gravel                       | - Coarse - 3/4 inch to 3 inches | With                 | 16 - 29% |
|                              | Fine - 4.76 mm to 3/4 inch      | Sandy                | 30 - 50% |
| Sand                         | - Coarse - 2 mm to 4.76mm       | (or gravelly)        |          |
|                              | Medium - 0.42 mm to 2 mm        |                      |          |
|                              | Fine - 0.074 mm to 0.42 mm      |                      |          |
| Silt & Clay                  | - Less than 0.074 mm            |                      |          |

## CLASSIFICATION, SYMBOLS AND TERMS USED ON GRAPHICAL BORING LOGS

# **LOG OF BORING NO. 1** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



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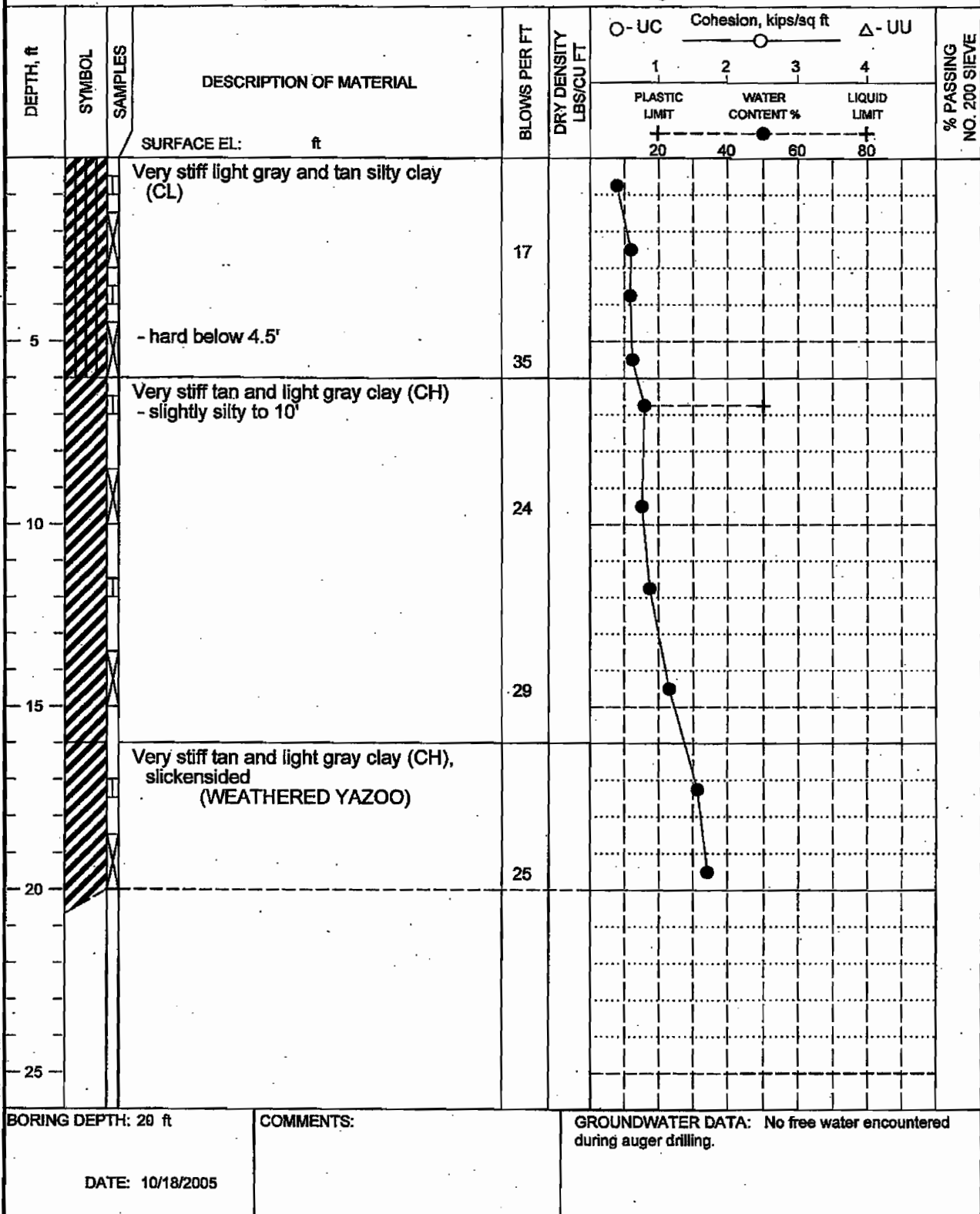
BURNS COOLEY DENNIS, INC.  
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS

**FIGURE 3**

# **LOG OF BORING NO. 2** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



060561 DO 9/7/2006 11:31:56 AM

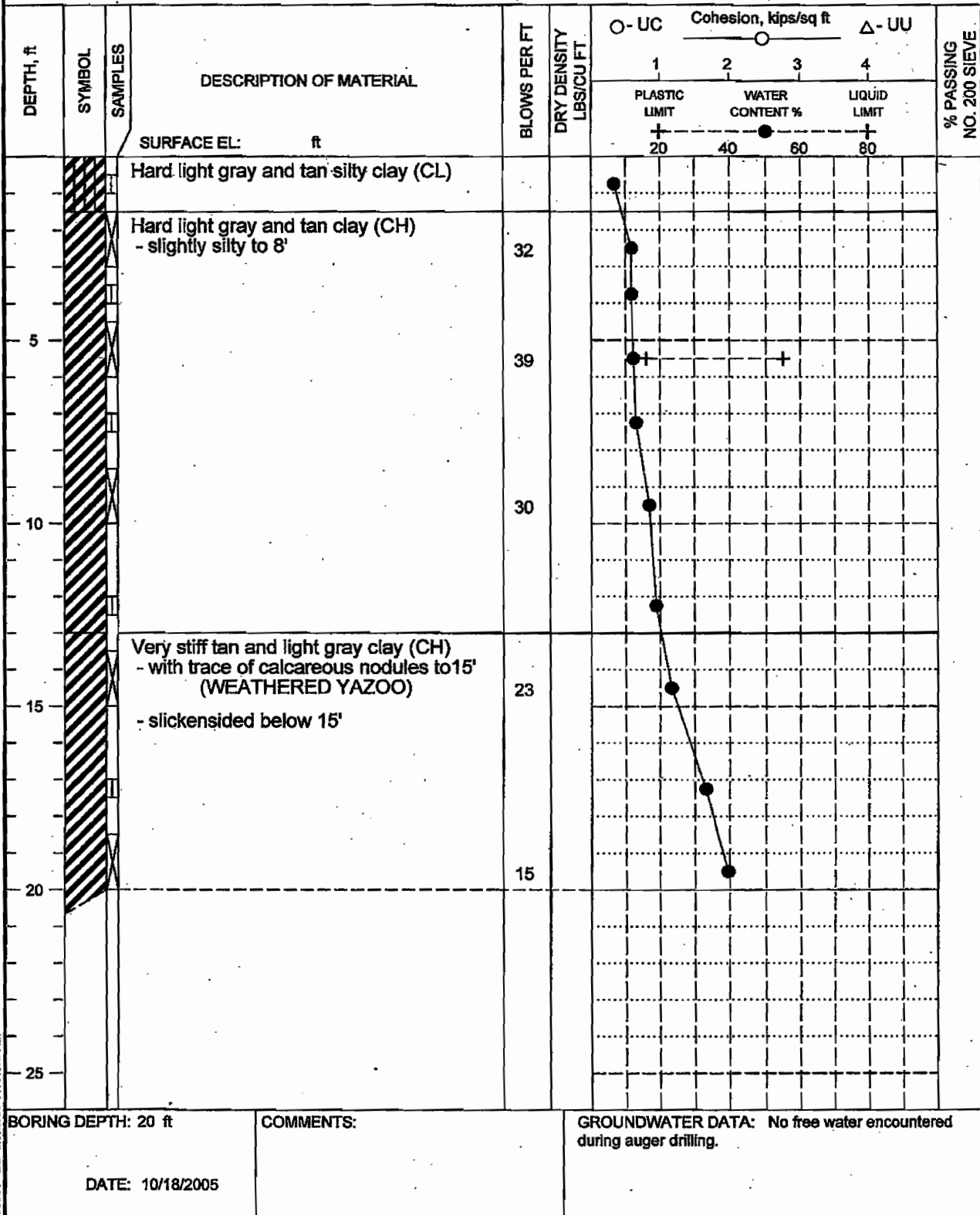
BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

FIGURE 4

# **LOG OF BORING NO. 3** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



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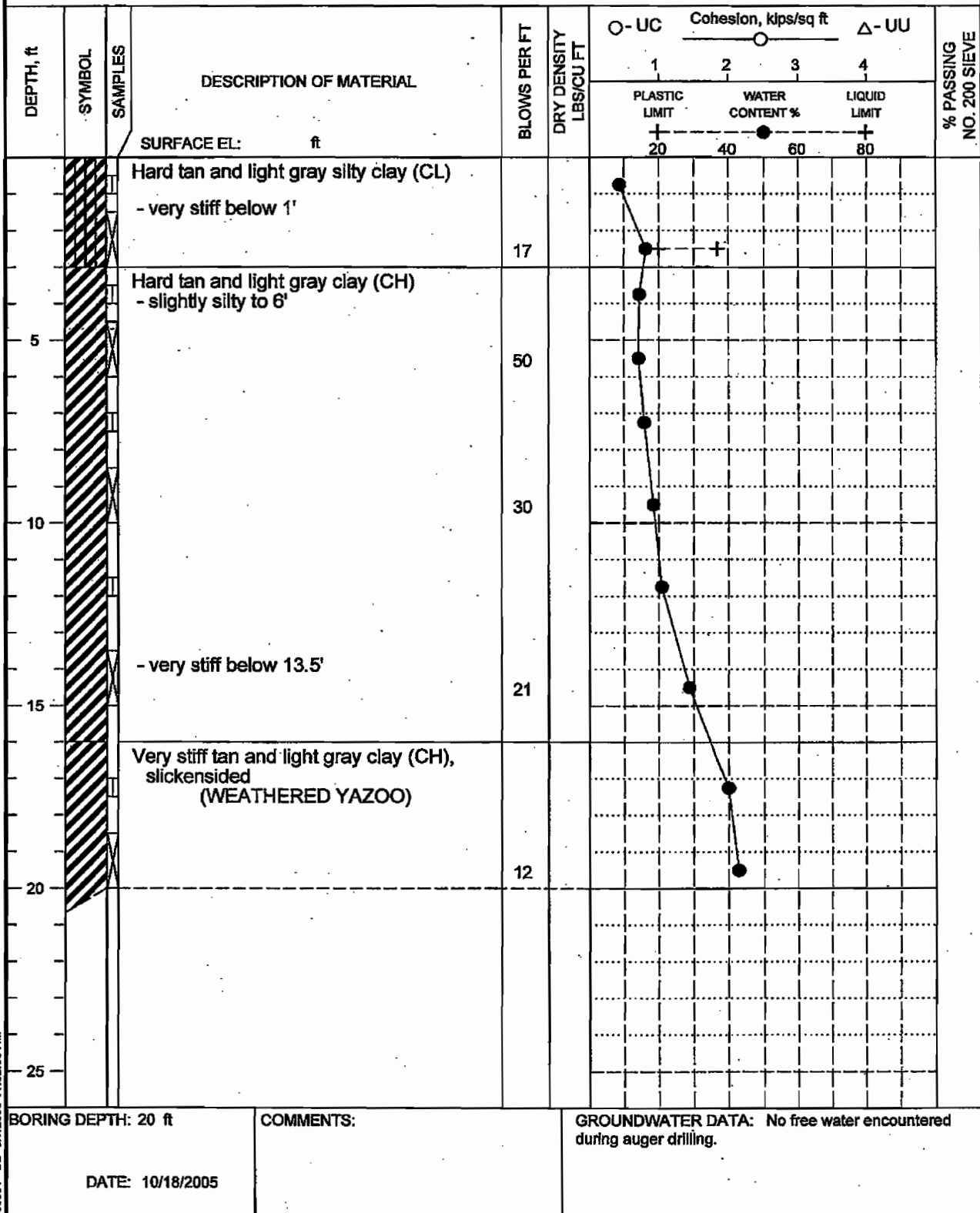
BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

**FIGURE 5**

# **LOG OF BORING NO. 4** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 6" Short-flight auger

LOCATION: See Figure 1



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BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS

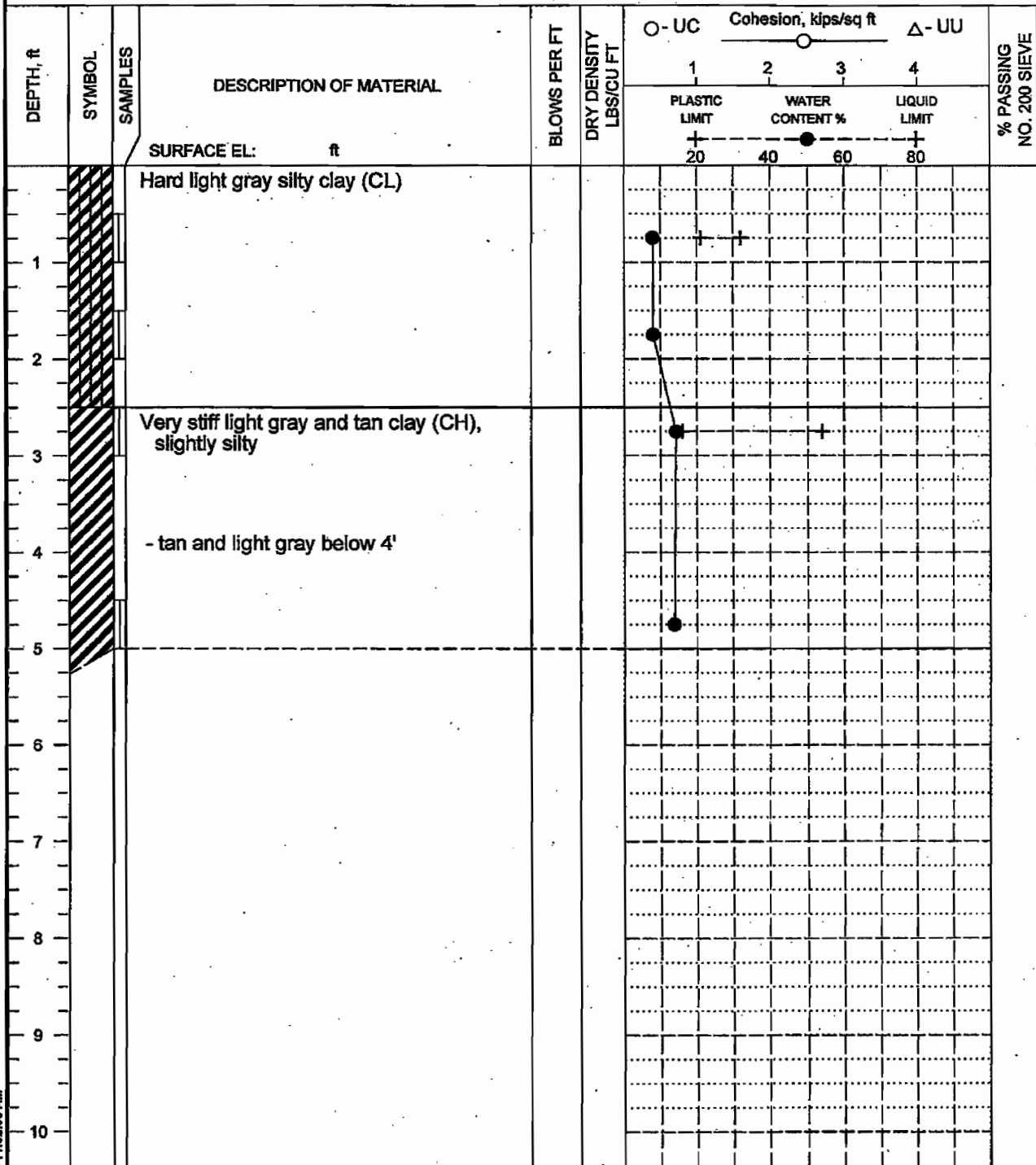
**FIGURE 6**



# **LOG OF BORING NO. 5** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



BORING DEPTH: 5 ft

COMMENTS:

GROUNDWATER DATA: No free water encountered during auger drilling.

DATE: 08/28/2006

080661 DD 9/7/2006 11:32:06 AM

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**FIGURE 7**

# **LOG OF BORING NO. 6** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1

| DEPTH, ft                       | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL                     | BLOWS PER FT | DRY DENSITY<br>LBS/CU FT | Cohesion, kips/sq ft                                                                                                                          |   |        | % PASSING<br>NO. 200 SIEVE |
|---------------------------------|--------|---------|---------------------------------------------|--------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---|--------|----------------------------|
|                                 |        |         |                                             |              |                          | O - UC                                                                                                                                        |   | Δ - UU |                            |
|                                 |        |         |                                             |              |                          | 1                                                                                                                                             | 2 | 3      |                            |
| SURFACE EL:                  ft |        |         |                                             |              |                          | PLASTIC LIMIT      WATER CONTENT %      LIQUID LIMIT<br>+-----+-----+-----+<br>20                  40                  60                  80 |   |        |                            |
| 1                               |        |         | Hard light gray silty clay (CL)             |              |                          |                                                                                                                                               |   |        |                            |
| 2                               |        |         | Hard light gray clay (CL), slightly silty   |              |                          |                                                                                                                                               |   |        |                            |
| 3                               |        |         | - very stiff, tan and light gray below 2.5' |              |                          |                                                                                                                                               |   |        |                            |
| 4                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 5                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 6                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 7                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 8                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 9                               |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |
| 10                              |        |         |                                             |              |                          |                                                                                                                                               |   |        |                            |

BORING DEPTH: 5 ft  
  
 DATE: 08/28/2006

COMMENTS:

GROUNDWATER DATA: No free water encountered during auger drilling.

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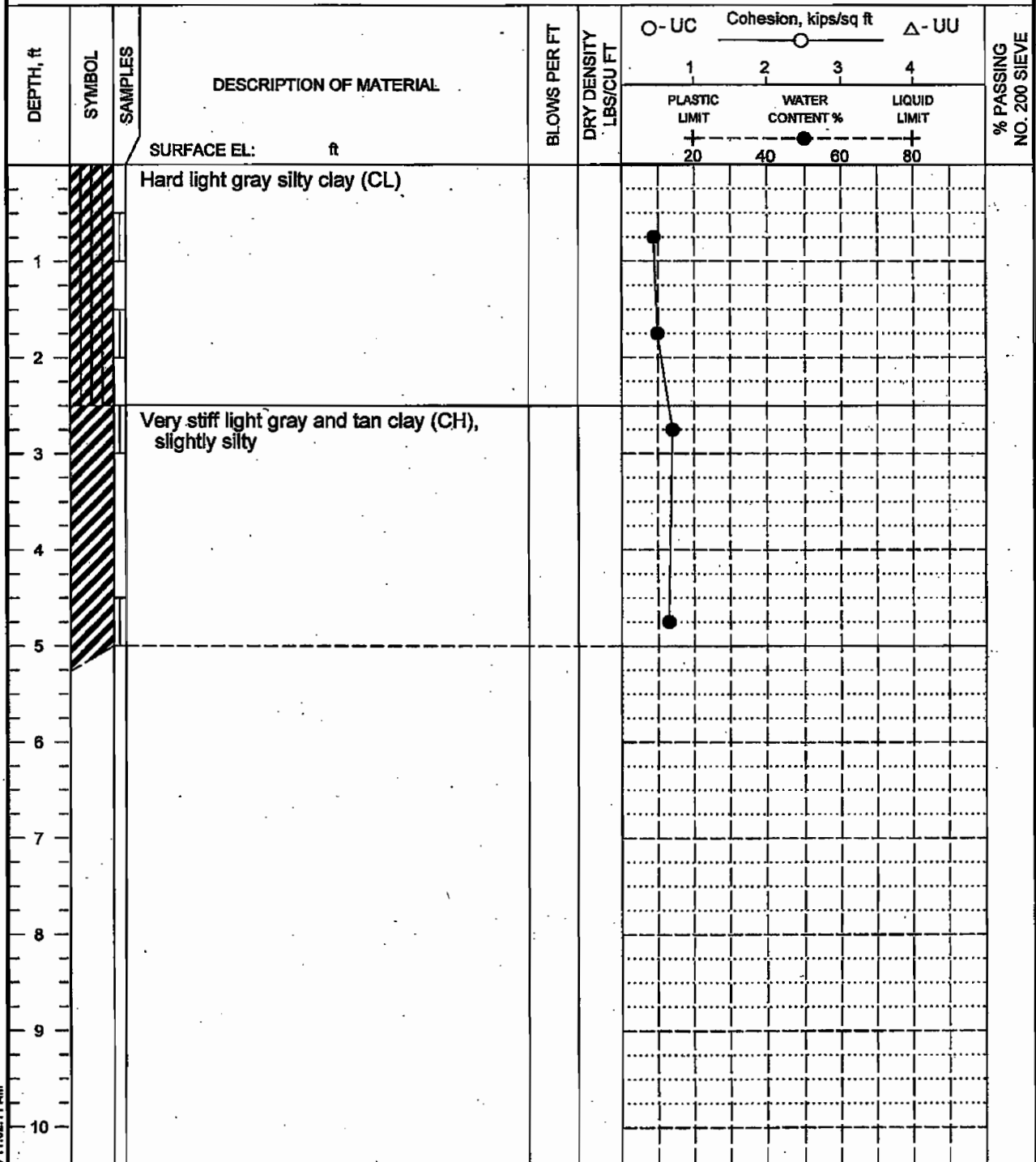
BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

**FIGURE 8**

# **LOG OF BORING NO. 7** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



BORING DEPTH: 5 ft

COMMENTS:

GROUNDWATER DATA: No free water encountered during auger drilling.

DATE: 08/28/2006

060851 DD 9/7/2008 11:32:11 AM

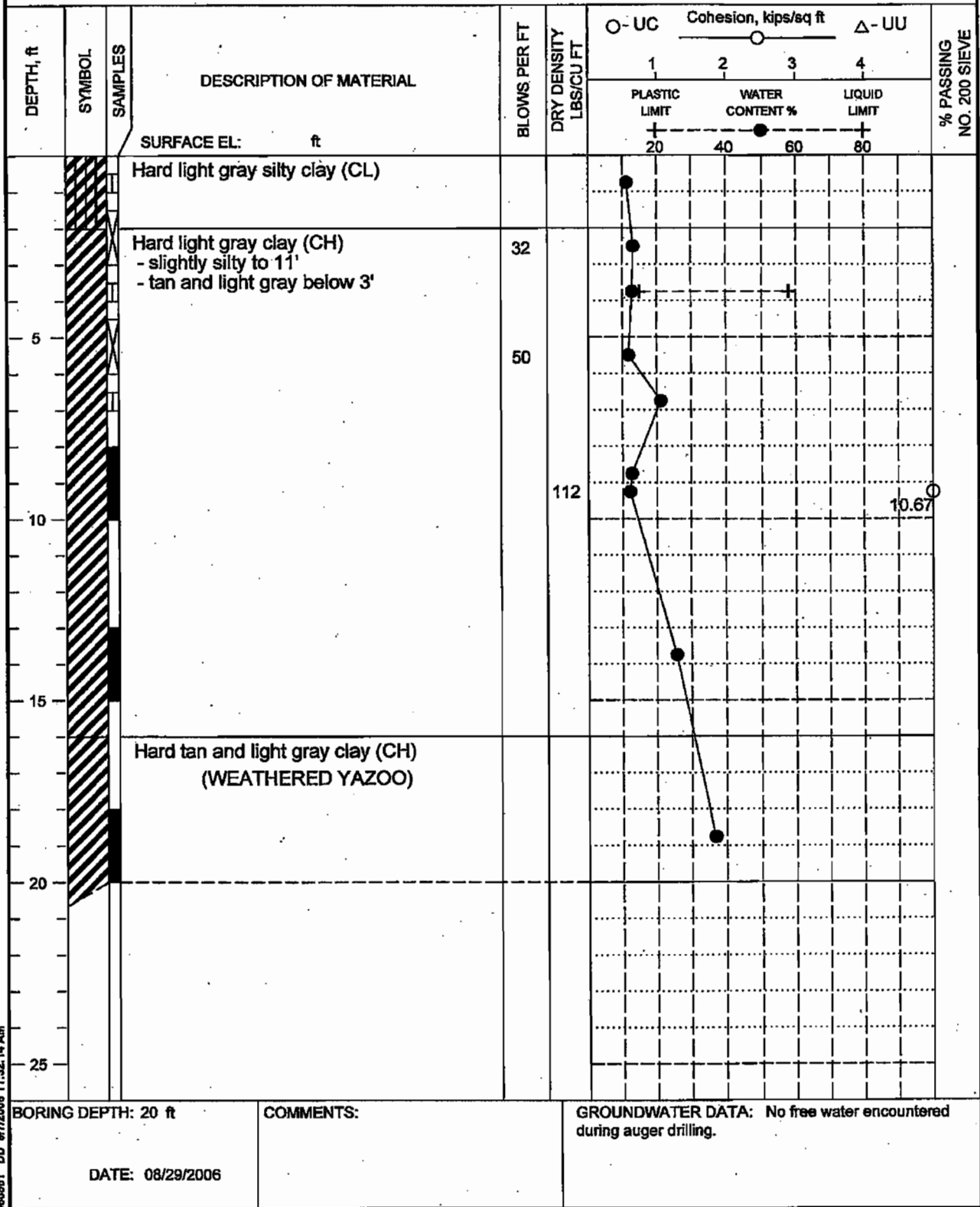
BURR'S COOLEY BENNIS, INC.  
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**FIGURE 9**

# **LOG OF BORING NO. 8** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



060551 DD 9/7/2008 11:32:14 AM

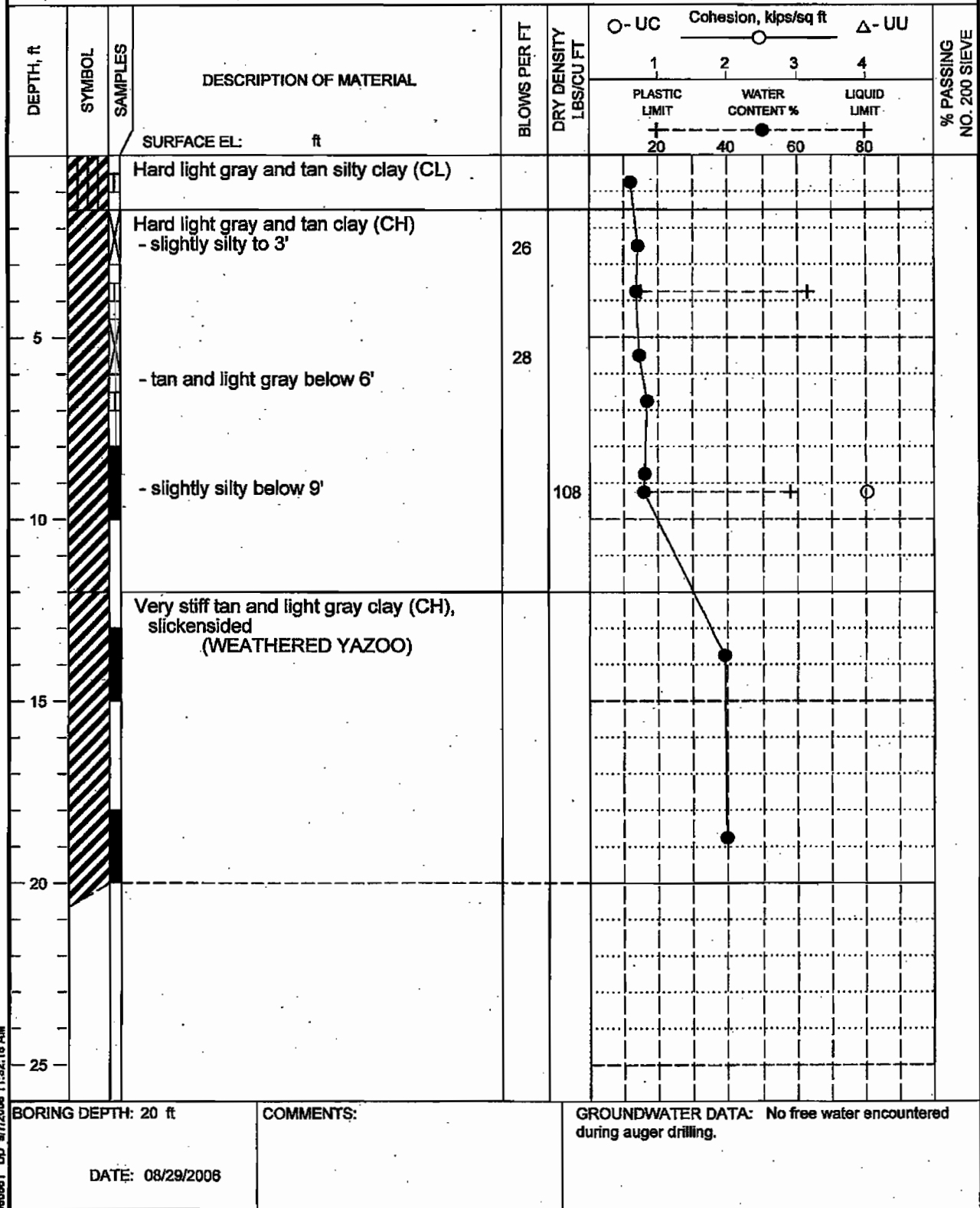
BURNS COOLEY DENNIS, INC.  
GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

**FIGURE 10**

**LOG OF BORING NO. 9**  
**COMFORT SUITES AND HAMPTON INN**  
**FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



060881 DD 9/7/2008 11:32:18 AM

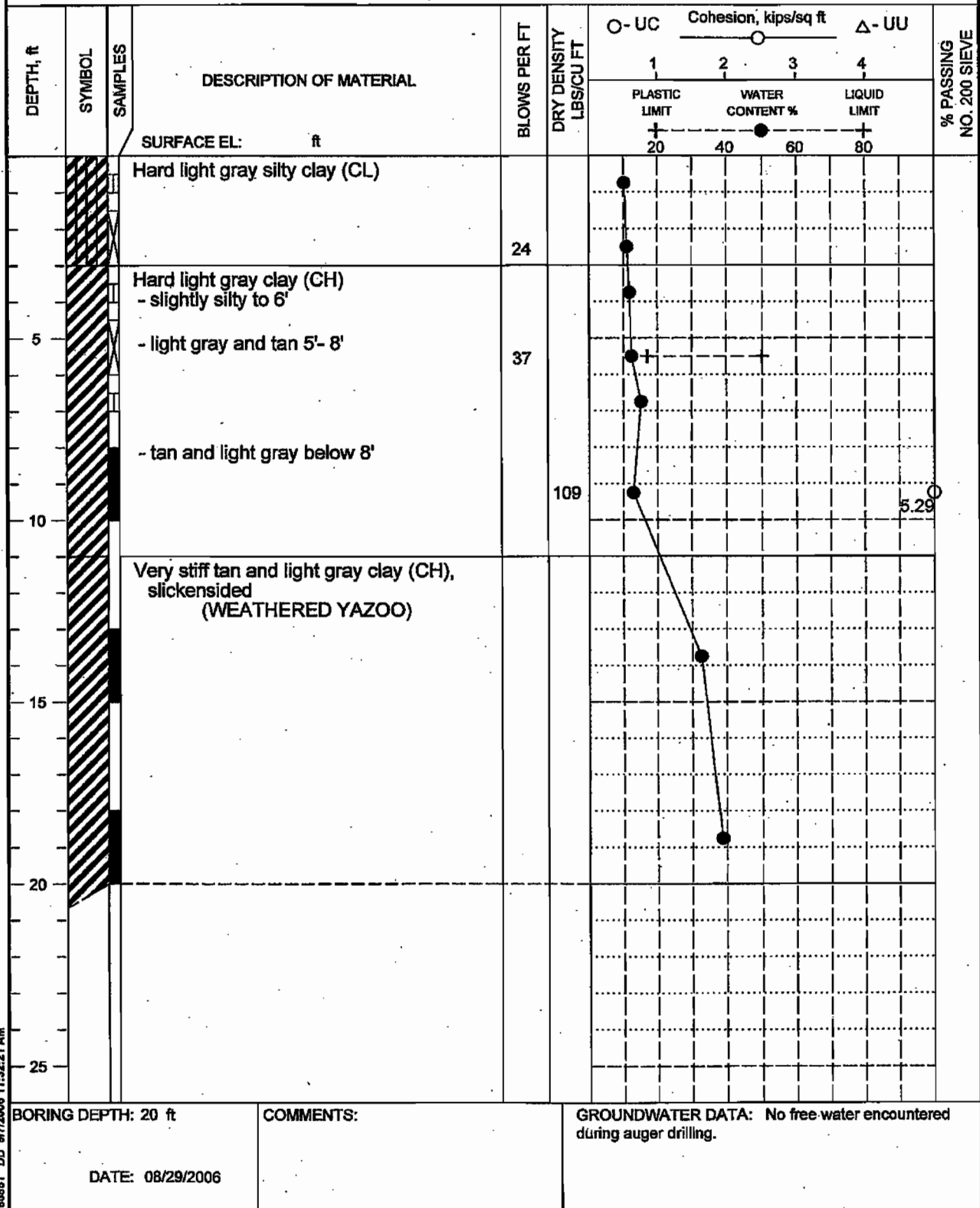
BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS

**FIGURE 11**

**LOG OF BORING NO. 10**  
COMFORT SUITES AND HAMPTON INN  
FLOWOOD, MISSISSIPPI

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



080551 DD 9/7/2006 11:32:21 AM

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**FIGURE 12**

IMA 47326:11 06027179 77 196905  
07/17/2006 11:32:24 AM

**LOCATION:** See Figure 1

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**FIGURE 13**

| LOG OF BORING NO. 12           |        |         |                                                                         |              |                          |                      |   |   |   |                            |
|--------------------------------|--------|---------|-------------------------------------------------------------------------|--------------|--------------------------|----------------------|---|---|---|----------------------------|
| COMFORT SUITES AND HAMPTON INN |        |         |                                                                         |              |                          |                      |   |   |   |                            |
| FLOWOOD, MISSISSIPPI           |        |         |                                                                         |              |                          |                      |   |   |   |                            |
| TYPE: 4" Short-flight auger    |        |         |                                                                         |              | LOCATION: See Figure 1   |                      |   |   |   |                            |
| DEPTH, ft                      | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL                                                 | BLOWS PER FT | DRY DENSITY<br>LBS/CU FT | Cohesion, kips/sq ft |   |   |   | % PASSING<br>NO. 200 SIEVE |
|                                |        |         |                                                                         |              |                          | 1                    | 2 | 3 | 4 |                            |
| SURFACE EL:      ft            |        |         |                                                                         |              |                          |                      |   |   |   |                            |
| 5                              |        |         | Hard light gray silty clay (CL)                                         | 25           |                          |                      |   |   |   |                            |
|                                |        |         | Hard light gray clay (CH), slightly silty                               | 28           |                          |                      |   |   |   |                            |
|                                |        |         | - light gray and tan below 5'                                           |              |                          |                      |   |   |   |                            |
| 10                             |        |         | Very stiff tan and light gray clay (CH), slickensided (WEATHERED YAZOO) | 107          |                          |                      |   |   |   | 10.38                      |
| 15                             |        |         |                                                                         |              |                          |                      |   |   |   |                            |
| 20                             |        |         |                                                                         |              |                          |                      |   |   |   |                            |
| 25                             |        |         |                                                                         |              |                          |                      |   |   |   |                            |

BORING DEPTH: 20 ft

DATE: 08/29/2006

COMMENTS:

GROUNDWATER DATA: No free water encountered during auger drilling.

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**STRUCTURAL AND MATERIALS ENGINEERING CONSULTANTS**

**FIGURE 14**



**LOG OF BORING NO. 13**  
**COMFORT SUITES AND HAMPTON INN**  
**FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1

| DEPTH, ft                       | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL                           | BLOWS PER FT | DRY DENSITY<br>LBS/CU FT | Cohesion, kips/sq ft                                                                                                                          |   |        |   | % PASSING<br>NO. 200 SIEVE |
|---------------------------------|--------|---------|---------------------------------------------------|--------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---|--------|---|----------------------------|
|                                 |        |         |                                                   |              |                          | O - UC                                                                                                                                        |   | Δ - UU |   |                            |
|                                 |        |         |                                                   |              |                          | 1                                                                                                                                             | 2 | 3      | 4 |                            |
| SURFACE EL:                  ft |        |         |                                                   |              |                          | PLASTIC LIMIT      WATER CONTENT %      LIQUID LIMIT<br>+-----+-----+-----+<br>20                  40                  60                  80 |   |        |   |                            |
| 1                               |        |         | Hard light gray silty clay (CL)                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 2                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 3                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 4                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 5                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 6                               |        |         | Hard tan and light gray clay (CH), slightly silty |              |                          |                                                                                                                                               |   |        |   |                            |
| 7                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 8                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 9                               |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |
| 10                              |        |         |                                                   |              |                          |                                                                                                                                               |   |        |   |                            |

BORING DEPTH: 5 ft  
  
 DATE: 08/28/2006

COMMENTS:

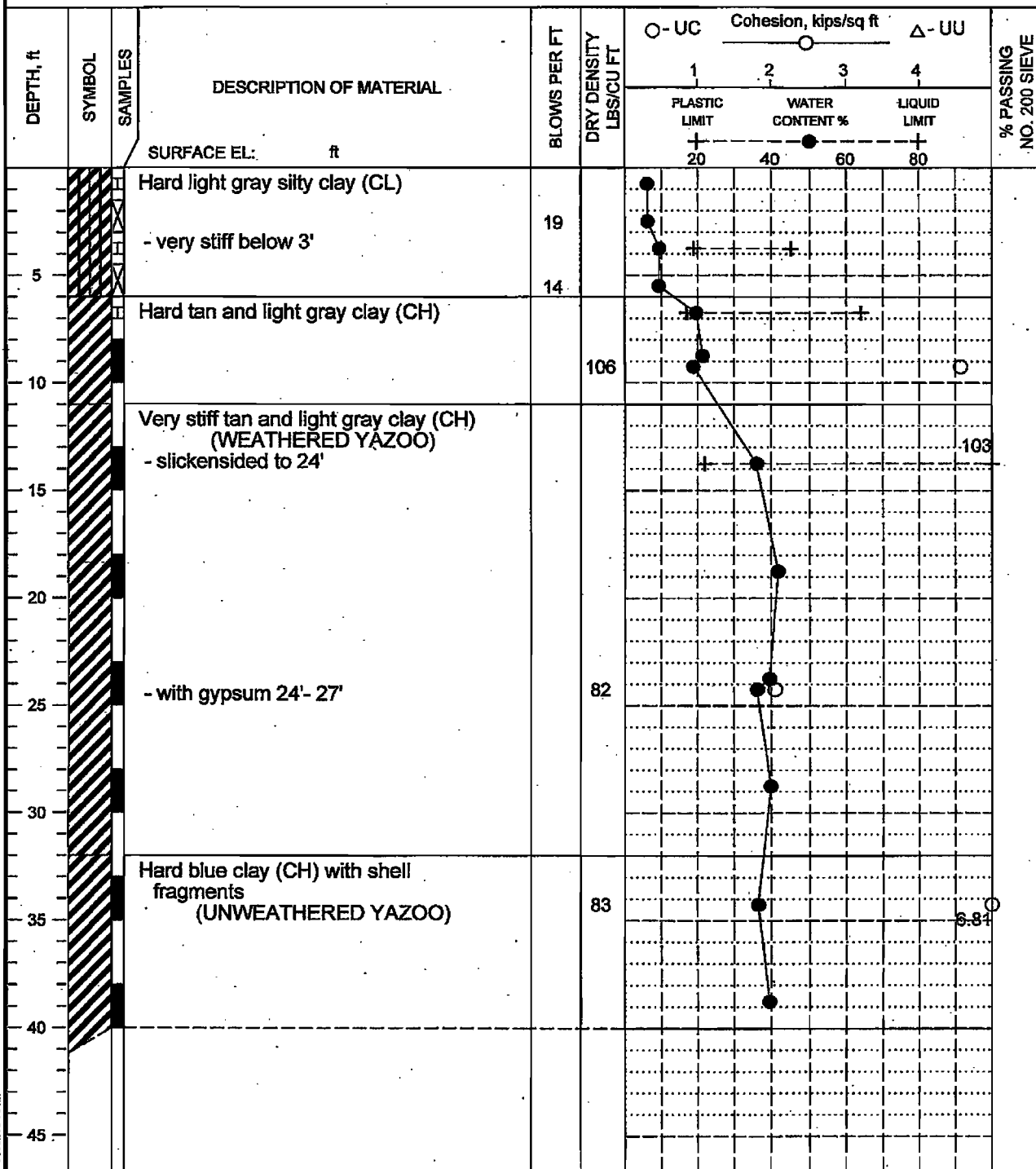
GROUNDWATER DATA: No free water encountered during auger drilling.

080561 DD 9/7/2008 11:32:31 AM

# **LOG OF BORING NO. 14** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



|                     |                                                                                                  |                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| BORING DEPTH: 40 ft | COMMENTS: Borehole filled with cement-bentonite grout after completion of drilling and sampling. | GROUNDWATER DATA: No free water encountered during auger drilling. |
| DATE: 08/28/2006    |                                                                                                  |                                                                    |

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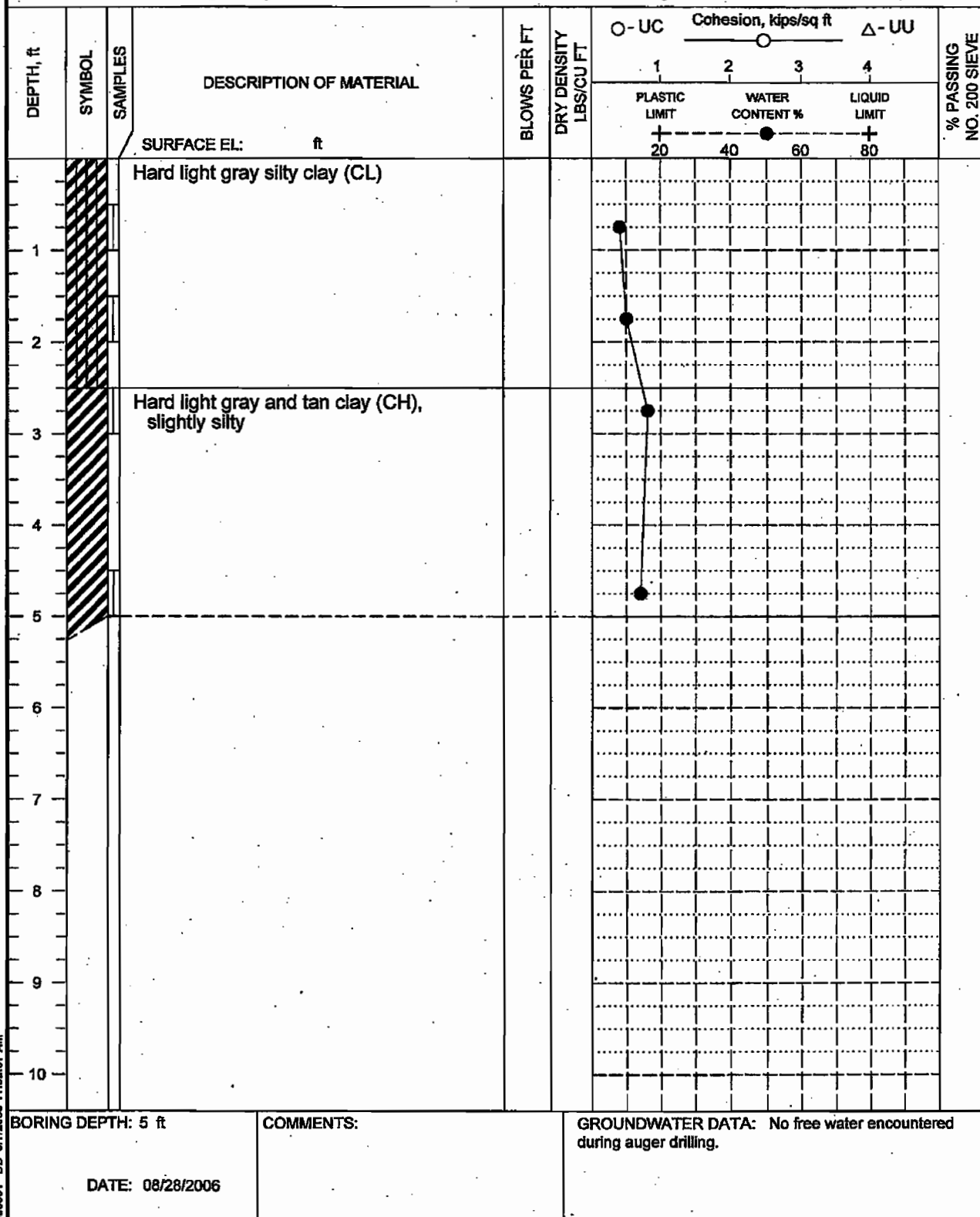
**FIGURE 16**

080551 DD 8/27/2006 11:32:34 AM

# **LOG OF BORING NO. 15** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1

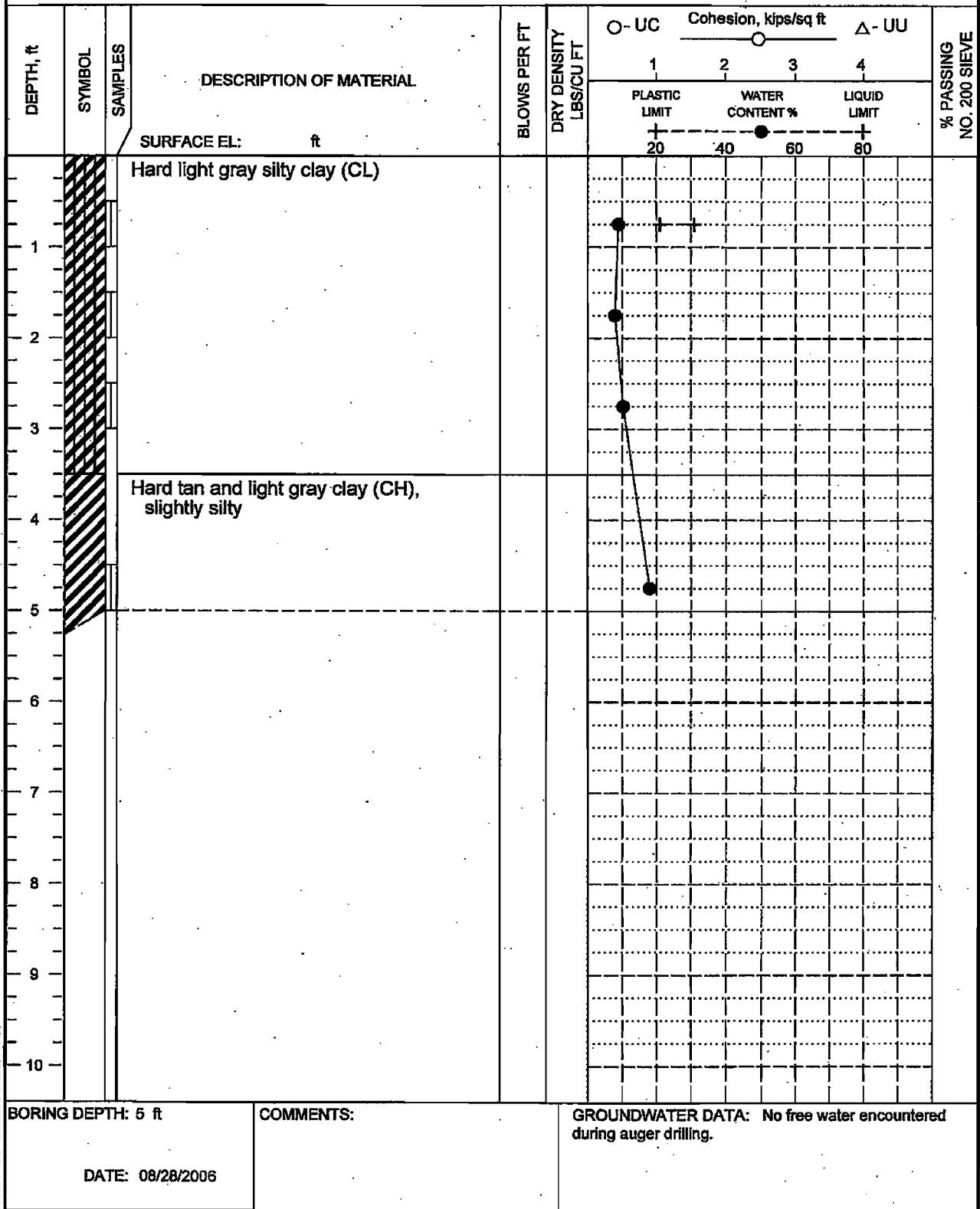


080651 DD 8/7/2008 11:32:37 AM

# **LOG OF BORING NO. 16** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



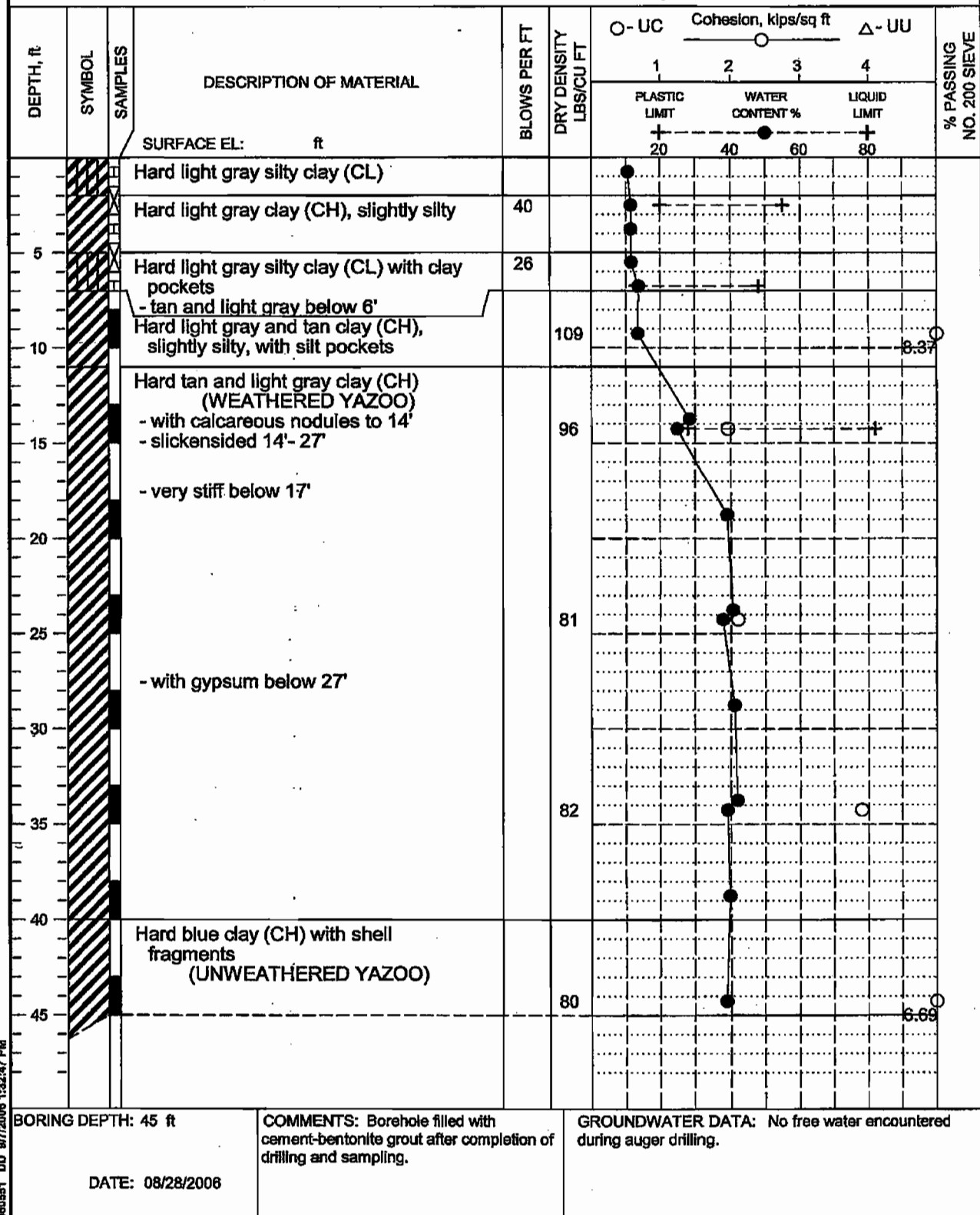
000051 DD 8/27/2006 11:32:40 AM

**FIGURE 18**

# **LOG OF BORING NO. 17** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

TYPE: 4" Short-flight auger

LOCATION: See Figure 1



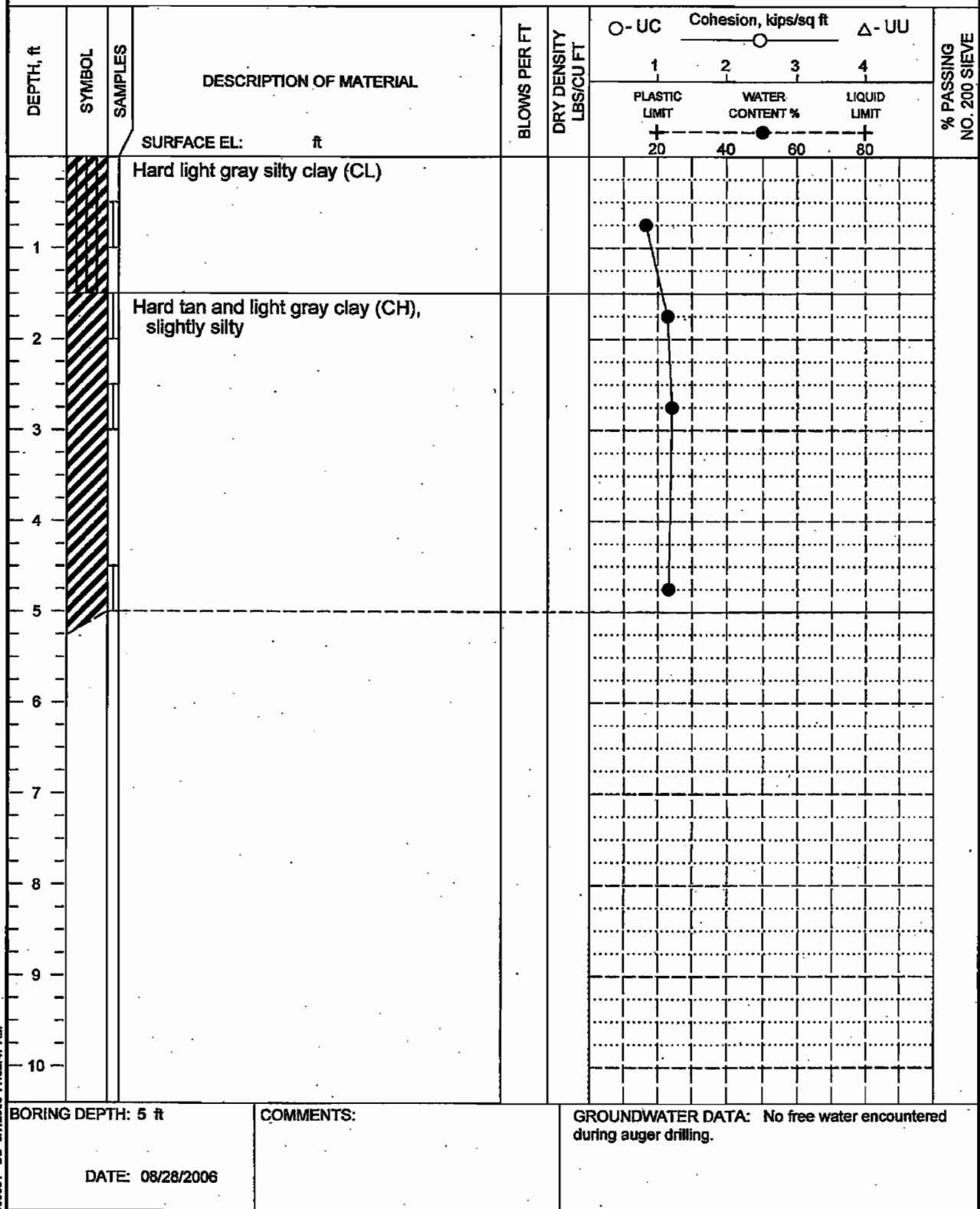
BURNS COOLEY DENNIS, INC.  
 GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

**FIGURE 19**

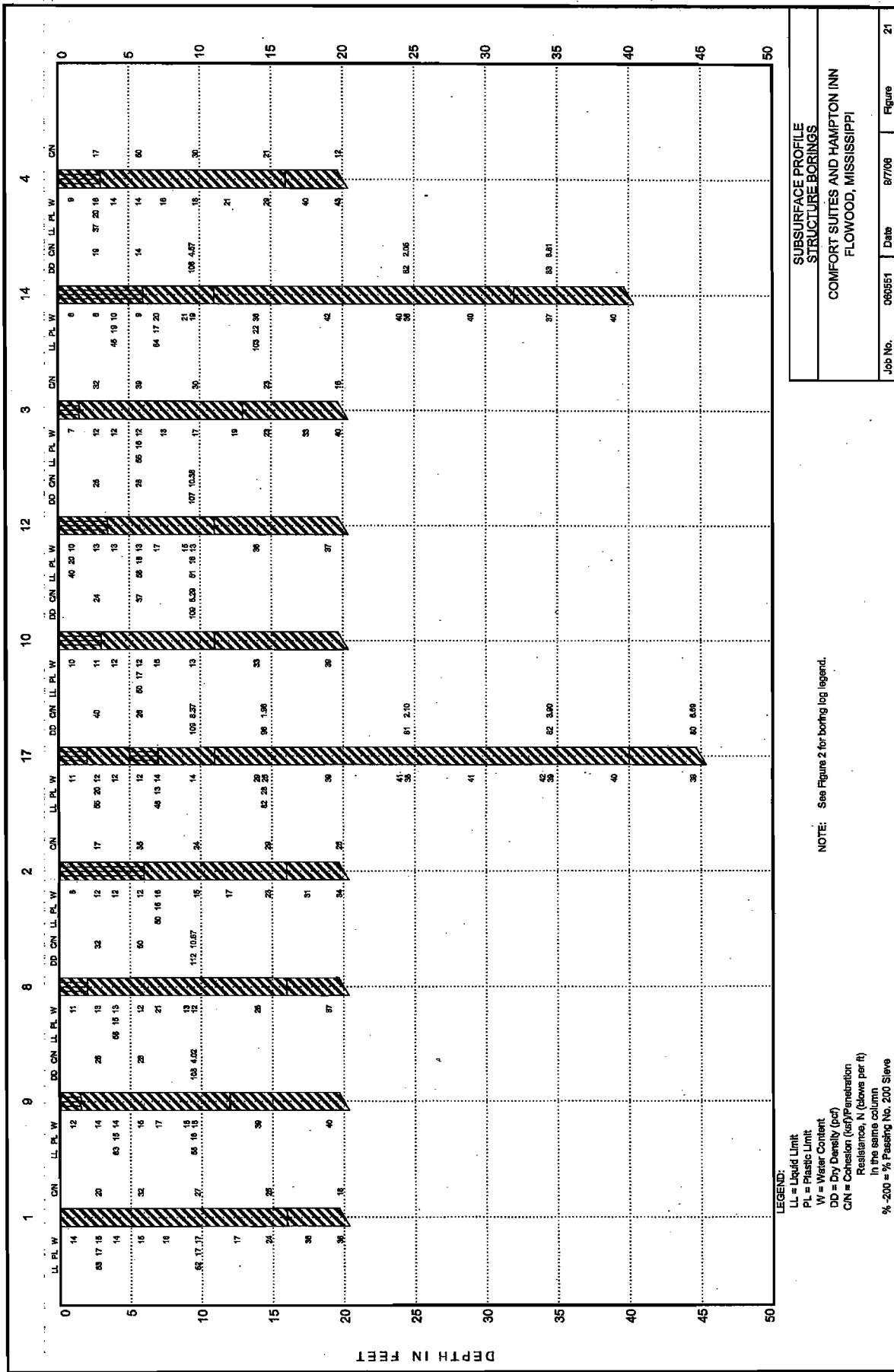
# **LOG OF BORING NO. 18** **COMFORT SUITES AND HAMPTON INN** **FLOWOOD, MISSISSIPPI**

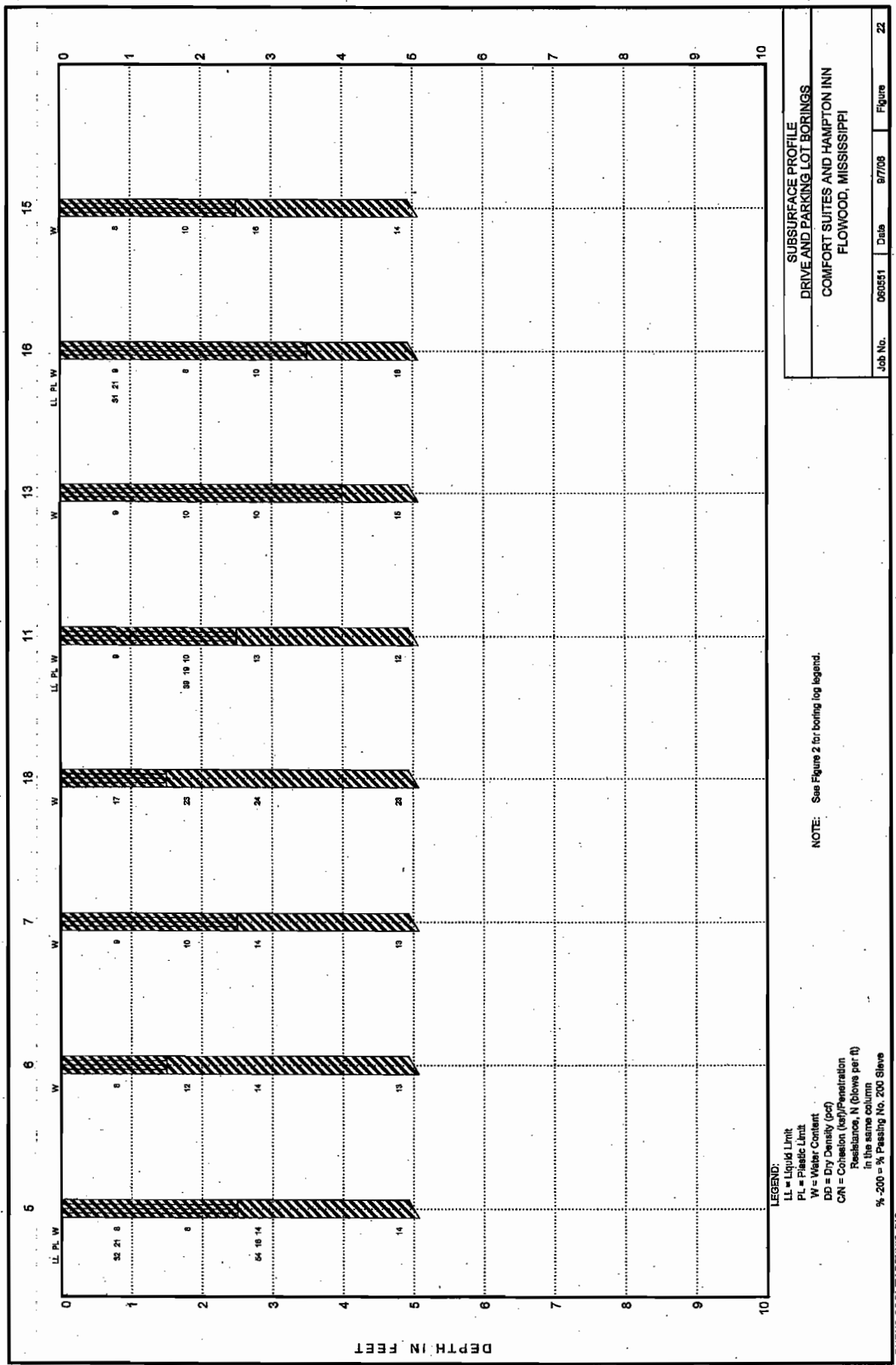
TYPE: 4" Short-flight auger

LOCATION: See Figure 1



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**DIVISION 2 SITE WORK****SECTION 02010. SUBSURFACE INVESTIGATION****PART 1. GENERAL****1.01 WORK INCLUDED**

- A. The Owner has contracted an independent testing lab to take soil borings throughout project sites.
- B. Data on indicated subsurface conditions is not intended as representations or warranties of accuracy or continuity between soil borings. It shall be expressly understood that the Architect and Owner will not be responsible for interpretations or conclusions drawn by Contractor. Data is made available for convenience of Contractor. Boring findings are attached herein.
- C. The specified recommendations for soil preparation below footings, first floor slab, parking lot pavements and sidewalks shall be strictly adhered to. Any deviations to the recommended soil preparation as outlined in the report should be reported to the Architect prior to starting the work, for his acceptance or rejection, and direction on how to proceed.
- D. It shall be the General Contractor's responsibility to coordinate an independent and acceptable Soils Engineer to monitor the earthwork, fill and foundation preparation procedures.
  - 1. Soils Engineer to monitor and prepare written reports as determined by his professional judgment or as indicated in the soils report.
  - 2. Contractor is not to proceed with any footings or slab installation unless agreed to by the Soils Engineer.
  - 3. Compaction and Soils reports should be submitted to the Architect, Owner, and General Contractor.
- E. Unit Pricing
  - 1. Per the recommendation of the soils boring report included in this specification, the Contractor shall establish unit prices of engineered fill placement, unacceptable soil removal, and/or rock removal - **prior to contract!**

**SECTION 02100. SITE PREPARATION****PART 1. GENERAL****1.01 WORK INCLUDED**

- A. Extent of site preparation is shown on Site Plan.

- B. Site preparation shall include all materials, labor and equipment necessary for the following:
1. Removal and relocation or disposal of all curbing, walks, paving, fencing, signage, guardrails, or other above grade improvements as indicated or required for construction (or as mentioned in the Soils Engineer's report).
  2. Removal and relocation or disposal of all rocks, trees, shrubs, plants or other vegetation as indicated or required for construction.
  3. Removal and capping of all site utility improvements indicated to be removed including yard drains, catch basins or utility vaults.
  4. Protection for all curbing, walks, paving, fencing, signage, guard rails, or other grade improvements indicated to remain.
  5. Protection for all trees, shrubs, plants or other vegetation indicated to remain.
  6. Stripping and stockpiling of topsoil.

## **PART 2. EXECUTION**

### **2.01 ABOVE GRADE IMPROVEMENTS**

- A. Completely remove and relocate or dispose of all curbing, walks, paving, fencing, signage, guard rails, or other above grade improvements as indicated or required for construction. Removal shall include all base materials down to the original sub-base.
- B. Protect from damage all curbing, walks, paving, fencing, signage, guardrails, or other above grade improvements indicated to remain in place as required by construction.
- C. Restore all damaged improvements to their original condition as acceptable to the Owner, Architect, and all other parties having jurisdiction.
- D. Benchmarks, monuments and reference points shall be carefully maintained and if disturbed or destroyed, shall be replaced to match originals and as reviewed by the Owner or Architect.

### **2.02 ROCKS, TREES, SHRUBS, PLANTS, OTHER VEGETATION AND TOPSOIL**

- A. Completely remove and relocate or dispose of all rock, trees, shrubs, plants and other vegetation as indicated or required for construction.
- B. Protect existing rocks, trees, shrubs, plants and other vegetation indicated to remain, from unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, and foot or vehicular traffic, or parking within drip line. Provide temporary guards as required or directed by Owner or Architect.
- C. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
- D. Provide protection for roots over 1-1/2" diameter cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

- E. Save or replace all rocks, trees, shrubs, plants and other vegetation indicated to remain which are damaged by construction, in a manner acceptable to the Owner and Architect. Employ qualified tree surgeon to repair damages to trees and shrubs.
- F. Replace trees that cannot be saved and restored to full-growth status, as determined by tree surgeon.
- G. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4", reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, without weeds, roots and other objectionable material.
- H. Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles, if required, to prevent wind-blown dust or erosion by wind or water.

#### 2.03 UTILITY REMOVAL

- A. Remove and cap all existing utility lines, catch basins, yard drains and utility vaults as indicated on the Site Demolition Drawings.

#### 2.04 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted on Owner's property.
- B. Remove all waste materials and unsuitable and excess topsoil and dispose of off site.
- C. Keep all public streets and roads clean in accordance with local authorities.

#### 2.05 EROSION CONTROL

- A. Protect newly graded areas from actions of the elements. Settlement or washing that occurs prior to acceptance of work or within the warranty period shall be repaired and maintained by the Contractor at no additional expense to the Owner.
- B. Contractor shall be fully responsible for any damage occurring to the property above or below the site that is a result of drainage or silt from the site. Contractor shall fully inspect prior to commencing any work, and take any precautions in addition to these hereinafter specified that he deems necessary to protect the adjacent property, at no additional cost to the Owner.
- C. Take all precautions possible to prevent erosion of all graded areas of the site.
- D. Install all storm drainage as grading progresses and make additional storm drainage installation possible. Direct swales to drainage structures as shown on drawings.

- E. Contractor shall construct any detention pond shown on the plans as soon as possible. Contractor shall remove silt as required and shall maintain pond until final acceptance of project by the Owner. Contractor shall also construct all other erosion control measures shown on plans at the earliest date practical.
- F. Contractor shall furnish and install all materials for silt retention barriers as detailed or required by local authorities.

#### **CLEAN UP**

1. During the construction and clean up, debris shall not be dumped on any part of the property or on any unauthorized place. All debris, construction material, Contractor's building or equipment, logs, stumps, boulders, or any other extraneous material deposited during construction shall be removed from the site. All existing debris or other extraneous material shall be removed from all undisturbed areas.

#### **PROTECTION OF EXISTING TREES REMAINING**

Protect tops, trunks and roots of trees; box, fence or otherwise protect trees that are subject to site work or construction damage. Do not allow heavy equipment or stockpiles within branch spread. Remove protection when danger of damage from these operations no longer exists.

#### **PROTECTION OF ADJACENT PROPERTY**

For the duration of the construction and until the Contractor is released, all adjoining property to the site is to be protected from drainage and debris. No trespassing is to be allowed on the adjoining property without the written permission of the property owner.

### **SECTION 02200. EARTHWORK**

#### **PART 1. GENERAL**

##### **WORK INCLUDED**

Earthwork shall include all material, labor, and equipment necessary to complete all excavation, compaction, backfilling, and grading to the completed subgrade elevation.

Extent of the earthwork is shown on the Drawings.

##### **WORK EXCLUDED**

Excavating, fillings, and backfilling required for Mechanical and Electrical work are not part of the Work of this Division of these specifications.

### 1.03 JOB CONDITIONS

- A. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
  - 1. Should uncharted, or incorrectly charted, piping or other utilities remain in place, provide adequate means of protection during earthwork operations.
  - 2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation.
  - 3. Repair damaged utilities to satisfaction of utility owner.
- B. The use of explosives is not permitted.
- C. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
- D. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

## PART 2. PRODUCTS

### 2.01 FILLS

- A. All on-site and imported fill shall be inspected, tested, and approved by a qualified testing laboratory. Soils encountered at the site may be considered suitable as backfill only with the approval of the Soils Engineer (Prequalify with Soils Engineer and the Owner prior to bidding).
- B. The Contractor shall furnish the Architect through the Soils Engineer samples of each type of fill to be used on the project. **Architect** shall authorize each type of fill material to be used on the project as structural fill.

### 2.02 ON-SITE FILL FOR USE AS STRUCTURAL "CONTROLLED FILL"

- A. On-site fill may be used as "controlled fill" provided that it can be compacted to 95% standard proctor dry density (ASTM B-1557) or unless additional restrictions are required in the soils report. On-site fill may be blended with imported fill material to improve ease of compaction unless stated otherwise in soils report. (Prequalify with Soils Engineer prior to bidding.)
- B. Fill shall be formed of suitable material obtained from excavation of the site and it shall be placed, processed and compacted to the lines and grades shown on the plans and in accordance with the requirements specified hereinafter. The need for some adjustment to the moisture content of all existing soils should be expected before they can be satisfactorily compacted.
- C. Materials to be used as "compacted controlled" fill shall have not more than 30% shall pass the one inch (1") sieve. The liquid limit shall not exceed 30 and plastic limit shall not exceed 10.

**2.03 IMPORTED FILL FOR USE AS STRUCTURAL "CONTROLLED FILL"**

- A. Materials to be used as "compacted controlled" fill shall be either A-1 (bank-run gravel), A-2 (sand and fines), or A-2-4 (silty-sand). The liquid limit shall not exceed 30. The plastic index shall not exceed 10. The minimum dry weight shall not have more than 30% shall pass the one-inch (1") sieve. Verify any further requirements requested in the soils report.
- B. Materials for use as structural "controlled fill" shall conform to the following limitations on gradation:

| <u>U.S. Std. Sieve</u> | <u>Percent Passing (by weight)</u> |
|------------------------|------------------------------------|
| 3" maximum             | 100%                               |
| 1"                     | Not to exceed 30%                  |
| #100                   | Not to exceed 45%                  |
| #200                   | Not to exceed 12%                  |

Compact off-site material to a minimum of 90% of modified proctor maximum dry density (ASTM D-1557) unless stated otherwise in soils report.

**2.04 "NON-STRUCTURAL" FILL**

- A. Materials for use in non-structural, non-paved or decked areas shall be on-site materials \* compacted to 90% of the modified proctor density (ASTM D-1557) unless stated otherwise in soils report. \* NOTE: Must be approved by Soils Engineer.
- B. Materials for paved areas shall be in strict accordance with Articles 2.01, 2.02, and 2.03.

**2.05 HAUL**

- A. A cut and fill balance has not been made. It shall be the Contractor's responsibility to establish what additional fill may have to be imported or excess to be hauled away. No additional compensation will be made for cut and fill.

**PART 3. EXECUTION****3.01 EXCAVATION**

- A. Excavation for foundations shall be as follows:
1. Conform to elevations and dimensions shown within a tolerance of plus or minus 2", and extending a sufficient distance from foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
  2. Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.
  3. When excavation has reached required subgrade elevations, notify Soils Engineer for inspection. If bearing materials are found to be unsuitable at required subgrade elevations, carry excavations deeper and replace excavated material **as directed by**

**Soils Engineer.** If the soils report indicates that overexcavation is likely, this contractor should figure his bid accordingly or agree to a fixed unit cost of proper fill in his contract.

- B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect or Soils Engineer. Unauthorized excavation, as well as remedial work directed by Architect or Soils Engineer, shall be at the Contractor's expense.
  - 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Soils Engineer.
  - 2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect.
- C. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
- D. Stockpile satisfactory excavated materials where directed, until required for backfill or fill.
- E. Protect all excavation bottoms against freezing when atmospheric temperature is less than 35° F (1° C).
- F. If pyrite deposits are encountered, all areas containing pyrites shall immediately receive two (2) coats at 1-1/2 gallons per 100 square feet each of Koppers Liquid Asphalt 4-60. Excavation must be maintained at 40° F throughout this application. If required, the contract shall be modified to add this extra cost.

### 3.02 COMPACTION

- A. It shall be the responsibility of the Contractor to provide equipment capable of compacting the fill soils to the degree specified herein. Generally steel wheel, vibratory or pneumatic tired rollers appear desirable for compaction of the predominately granular soils specified for use as "Controlled Fill".
- B. All "Controlled Fill" shall be placed in approximately horizontal lifts not exceeding nine inches (9") in loose thickness. So far as practical, each layer of material shall extend the entire length and width of the area being filled. Before compaction is started, the material shall be leveled by means of bulldozers, blade graders, or other use of dragline excavators or similar equipment that excavate and deposit material in a uniform manner. Large unit masses will not be permitted unless all materials excavated and placed in this manner are spread in the manner and to the thickness specified herein.

- C. Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).
  - 1. Structures, buildings, slabs and steps, pavements: Compact top 12" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 90% relative density for cohesionless soils.
  - 2. Lawn or unpaved areas: Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive soils and 90% relative density for cohesionless soils.
  - 3. Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% relative density for cohesionless material.
- D. Where subgrade or layer of soil material must be conditioned before compaction, uniformly apply water to surface or subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.
  - 1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  - 2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

### 3.03 BACKFILLING

- A. Place acceptable soil material in layers not exceeding 9" loose depth to required subgrade elevations for each area.

### 3.04 GRADING

- A. Uniform grade areas indicated, including adjacent transition areas.
- B. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- C. Fill under building slab shall be graded smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10'-0" straightedge.
- D. Subgrade below topsoil shall be 6" below finish grade.
- E. Subgrade below paving shall be as required by paving type.

### 3.05 PROOFROLLING

- A. The exposed subgrade shall be proofrolled with rubber tired equipment to check for pockets of soft material hidden beneath a thin crust of soil. Any soft materials thus exposed shall be removed and replaced with a well-compacted suitable fill. Roller to be either pneumatic tired, flat wheel, vibratory, or 10 wheel tandem axle truck, grossing a minimum of 15 tons. The proofrolling shall be supervised by a Soils Engineer.



- B. All exposed surfaces should be compacted to a minimum 90% modified proctor (ASTM D 1557) for a 6" depth by proofrolling.

### 3.06 FOUNDATION BACKFILL

- A. The Contractor shall remove all trash, wood chips and debris from the excavation to the backfill. Under no circumstances shall frozen earth be used for fill nor shall fill be placed on frozen earth.
- B. Backfill with clean earth when footings and foundation walls are complete, but not before walls have attained full design strength and membrane waterproofing has been installed, if required.
- C. Care shall be exercised in compacting fill and backfill to prevent displacement of walls. Should damage to foundation walls occur during compaction, the Contractor shall replace such work at no additional cost to Owner. Only hand operated equipment should be used within four feet (4'-0") of the walls.
- D. Any backfilling adjacent to foundations, grade beams or other portions of the proposed structure must be thoroughly compacted to no less than 90% of the proctor maximum dry density (ASTM D 1557) unless stated otherwise in the soils report. This is emphasized as being critical in those areas of traffic loading. Backfill shall be free drainage granular material with the top three feet being a clayey material for a seal.
- E. Where fill is placed both outside and inside of foundation walls, the fill shall be built simultaneously on both sides of the walls.

### 3.07 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, unacceptable excavated materials, trash, and debris and dispose of off site.

## **SECTION 02260. FINISHED GRADING**

### **PART 1. GENERAL**

#### **1.01 WORK INCLUDED**

- A. Finish grading shall include all material, labor and equipment necessary to place topsoil on subgrade to the final grades shown on the drawings, adequately compacted and ready for seeding, sodding or landscaping.
- B. Extent of finish grading is shown on Drawings.

### **PART 2 PRODUCTS**

- A. Topsoil stockpiled at site shall be used. Additional topsoil required to achieve finish grade shall be included as a part of this section at Contractor's expense and shall meet the following specifications.

1. The material shall consist of loose, friable, loamy topsoil without admixture of subsoil or refuse. For topsoil to be considered loamy, that fraction passing the Number 10 sieve shall contain not more than 40% clay.
2. Acceptable topsoil shall contain not less than 5% nor more than 20% organic matter as determined by loss on ignition or samples oven dried to constant weight at 212° F.
3. Acceptable topsoil shall be free of roots, stumps, and stones larger 2" in any dimension, and other extraneous or toxic matter harmful to plant growth.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Construction refuse and rubbish, wherever encountered, shall be removed from the site.
- B. Obvious obstructions below grade shall be removed.
- C. Excavated material not useable as fill shall be removed from the site.

#### **3.02 SOIL PREPARATION**

- A. The subgrade shall be brought to a uniform grade everywhere, 6" below finished soil surface.
- B. All areas to be topsoiled shall have subgrade soil loosened to a depth of 2" and graded to remove all ridges and depressions, so that it will be parallel to the proposed finish grade. All stones over 2" in any dimension, sticks, rubbish and other extraneous matter, shall be removed during this operation.
- C. No heavy objects, except lawn rollers, shall be moved over lawn areas after the subgrade soil has been prepared.

#### **3.03 TOPSOIL PLACEMENT**

- A. Topsoil shall be spread evenly thereon by approved method to the required depth, and the area then rolled with a 200 pound roller.
- B. No topsoil shall be spread in a frozen or muddy condition.
- C. Where topsoil already lies in place, the topsoil surface shall be loosened by disk and harrow or grubbed to a depth of 4" and all rocks, tree and weed roots removed prior to fine grading.
- D. For topsoiled areas, the finished surface of the topsoil shall conform to the finished grade, shall be free of hollows or other inequalities, and of stones, sticks and other extraneous matter, and shall be satisfactory to the Architect.
- E. G.C. to save topsoil and place in all areas where topsoil is required to grades as directed by Owner's Landscaper.

### **3.04 FINE GRADING**

- A. Topsoil shall be fine graded by methods approved by the Architect, removing stones, lumps, etc., and the entire areas shall be left ready for seeding, sodding or planting. The Architect shall be notified as to the exact day that the areas will be ready for planting.

### **3.05 TOPSOIL DEPTH**

- A. Soil areas when prepared and completed, shall be a uniform layer of loam 6" in depth.

### **3.06 UTILITIES**

- A. The installation of all underground utilities, drain tile, curbs, etc., shall be completed before final grading.
- B. All electric, telephone and cable systems should be in PVC conduit - no "direct burial".

### **3.07 LOT/BUILDING LIGHTING**

- A. All parking lot lights must be installed at the time the base parking lot goes in with underground utilities. The lights must be operable at this time. This is required by the insurance company. If any claim results due to these lots not being lit, or any type of vandalism occurs, Owner intends to hold General Contractor responsible.

## **SECTION 02280. SOIL TREATMENT**

### **PART 1. GENERAL**

#### **1.01 WORK INCLUDED**

- A. Termite Control.

#### **1.02 QUALITY ASSURANCE**

- A. Applicator shall be licensed, with at least five (5) years experience in application of specified soil treatment.

#### **1.03 SUBMITTALS**

- A. Product Data: Specifications data and complete literature describing products proposed for use. Application instructions including amounts recommended for conditions indicated.
- B. Certificate: In duplicate, stipulate amounts and locations.
- C. Warranty: 5 years.

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#### **1.04 DELIVERY, STORAGE AND HANDLING**

- A. Deliver soil poisoning agents to job site in sealed, labeled containers.
- B. Labels: Bear manufacturer's warning to be observed in handling and use of soil treatment materials.

#### **1.05 WARRANTY**

- A. Warrant termite treatment for five (5) years from date of application, and repair or replace damage during guarantee period caused by termites at no cost to the Owner.

### **PART 2. PRODUCTS**

#### **2.01 MATERIALS**

- A. Soil Poison Products:
  - 1. Dorsban TC Termiticide concentrate in strict conformance with Dow Elanco Specifications.
  - 2. Dragnet FT Termiticide by FMC Corporation used in strict accordance with FMC Corporation Specifications.
- B. Fuel oil dilutents are not permitted.
- C. Membrane type materials or building paper are not permitted.

### **PART 3. EXECUTION**

#### **3.01 PREPARATION**

- A. Provide warning signs displayed at approximately 50 foot intervals around perimeter of treated areas describing the materials used and their danger to personnel. Remove signs when treated areas have been covered with permanent materials.

#### **3.02 APPLICATION**

- A. Apply soil poison to prepare subgrade just prior to placing porous fill under concrete floor slab and just prior to backfilling around foundations.
- B. Apply soil treatment materials in accordance with precautions on label and as follows:
  - 1. Under slabs on grade: 1-1/2 gallons per 10 square feet as overall treatment. Apply 0.5 gallon per square foot in critical areas such as around utility openings for pipes, ducts and conduits. Apply 2 gallons per 5 linear feet in strip one foot wide along exterior perimeter of slab and under expansion joints.
  - 2. Foundation walls of structures: 2 gallons per 5 linear feet per foot of depth from finished grade to top of footings in strip one foot wide on exterior, with one-half of application near level of top of footings before any backfill is placed, remainder just below finished grade. Apply 2 gallons per 5 linear feet in strip one foot wide adjacent to interior side of building foundation in areas not covered by slabs on grade.

### 3.03 CLEAN UP

- A. Remove excess materials, rubbish and debris from site at completion of work.

## **SECTION 02500. PAVING AND SURFACING**

### **PART 1. GENERAL**

#### 1.01 WORK INCLUDED

- A. Paving and surfacing shall include all material, labor, and equipment necessary for all new site concrete, asphalt, culverts, metal headwalls aprons, and patching.
- B. Paving and surfacing shall include all material, labor, and equipment necessary for the following:
1. Aprons.
  2. Concrete paving and striping, car stops.
  3. Driveway and approach.
  4. Dumpster area concrete pad.

### **PART 2. PRODUCTS**

#### 2.01 MISCELLANEOUS MATERIALS

- A. Concrete forms shall be of steel, wood or other suitable material of size and strength to resist movement during concrete placement to retain horizontal and vertical alignment until removal. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.
- B. Welded wire fabric shall be welded plain cold-drawn steel wire fabric, ATSM A 185.
- C. Reinforcing bars shall be deformed steel bars, ASTM A 615, Grade 40 in sizes as shown on the Drawings.
- D. Expansion joint material shall be compressible, tar impregnated fiber board.
- E. Curing and sealing compound shall be "Evcocure", manufactured by The Euclid Chemical Company or approved equal.

#### 2.02 CONCRETE

- A. Design mix to produce normal weight concrete shall consist of portland cement aggregate, air-entraining admixture and water to produce the following properties:
1. Compressive strength 3,500 psi, minimum at 28 days.
  2. Slump range, 2" - 4".
  3. Air Content, 6% to 8%.
  4. Thickness and reinforcing as specified on the drawings.

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### **PART 3. EXECUTION - CONCRETE PAVEMENT**

#### **3.01 FORM CONSTRUCTION**

- A. Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork for grade and alignment to the following tolerances:
  - 1. Top of forms not more than 1/8" in 10'-0".
  - 2. Vertical face on longitudinal axis, not more than 1/4" in 10'-0".
- C. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

#### **3.02 CONCRETE PLACEMENT**

- A. Comply with requirements of Section 03300 for mixing and placing concrete, and as herein specified.
- B. Do not place concrete until base and forms have been checked for line and grade. Moisten base if required to provide a uniform dampened condition at time concrete is placed. Do not place around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing and joint devices.
- D. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

#### **3.03 JOINTS (CONCRETE CONSTRUCTION)**

- A. Construction expansion joints, control joints and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
- B. When joining existing structures, place joints to align with previously placed joints, unless otherwise indicated.
- C. Provide control joints, sectioning concrete into areas as shown on drawings but not more than 10'-0" to 12'-0" apart in either direction. Construct control joints for a depth equal to at least 1/4" concrete thickness, using one of the following techniques to match joints in existing concrete:
  - 1. Tooled joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

2. Sawed joints: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded or otherwise damaged by cutting action.
  3. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.
- D. Provide construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.
1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.
- E. Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.
1. Locate expansion joints at 50'-0" o.c. for each pavement lane, unless otherwise indicated.
  2. Extend joint fillers full-width and depth of joint and not less than 1/2" or more than 1'-0" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
  3. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.
  4. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

### 3.04 CONCRETE FINISHING

- A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- B. After floating, test surface for trueness with a 10'-0" straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide a continuous smooth finish.
- C. Work edges of slabs, gutters, back top edge of curb and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- D. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing as follows:
1. Broom finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation is required to provide a fine line texture acceptable to Architect.
- E. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

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### 3.05 CURING

- A. Protect and cure finished concrete paving, complying with applicable requirements of specified curing and sealing compound.

### 3.06 REPAIRS AND PROTECTIONS

- A. Repair or replace broken or defective concrete, as directed by Architect at no additional cost.
- B. Drill test cores where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy resin grout.
- C. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Sweep concrete pavement and wash free of stains, discoloration, dirt and other foreign material just prior to final inspection.

### 3.07 CAR STOPS - See Section 02800.

## PART 4 ASPHALT PAVING

- A. The Binder/Leveling course should be installed eight (8) weeks after the project is started. This means all utilities and underground work must be complete so this can take place in this time.
- B. Parking Aisles: Asphalt paving system shall consist of a 1½" thick Wearing Course and a 2" thick Binder/Leveling Course on a 8" thick Aggregate Base Course. (Supersedes the soils report)
- C. Driving Lanes: Asphalt paving system shall consist of a 1½" thick Wearing Course and a 2" thick Binder/Leveling Course on a 8" thick Aggregate Base Course. (Supersedes the soils report)
- D. The wearing course shall consist of aggregate and asphalt cement mixed in a central plant and spread and compacted on a prepared surface in reasonably close conformity with the lines grades and typical sections shown on the plans. The course aggregate (No. 8) and fine aggregate shall be combined in such proportions that the resulting blend shall be within the following limits:

| <u>Sieve</u> | <u>Total Passing % By Weight</u> |
|--------------|----------------------------------|
| 1/2 inch     | 100                              |
| 3/8 inch     | 90 - 100                         |
| No. 4        | 45 - 75                          |
| No. 16       | 15 - 45                          |
| No. 50       | 3 - 22                           |
| No. 200      | 0 - 8                            |



Bitumen content shall be within the following limits:  
 Bitumen (Percent of Total Mix): 4.5 - 12.0

- E. The Binder/Leveling course shall consist of aggregate and asphalt cement mixed in a central plant and spread and compacted on a prepared surface in reasonably close conformity with the lines grades and typical sections shown on the plans. The course aggregate (No. 67 or a blend of No. 6 and No. 8) and fine aggregate shall be combined in such proportions that the resulting blend shall be within the following limits:

| <u>Sieve</u> | <u>Total Passing % By Weight</u> |
|--------------|----------------------------------|
| 1 inch       | 100                              |
| 3/4 inch     | 90 - 100                         |
| 1/2 inch     | 65 - 90                          |
| No. 4        | 35 - 65                          |
| No. 16       | 15 - 45                          |
| No. 50       | 3 - 22                           |
| No. 200      | 0 - 8                            |

Bitumen content shall be within the following limits:  
 Bitumen (Percent of Total Mix): 4.5 - 12.0

- F. The aggregate base shall consist of furnishing, placing and compacting one or more courses of aggregate, including furnishing and incorporating all water required for compacting, on a prepared surface in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans. The aggregate shall be crushed carbonate stone, crushed gravel, other types of suitable materials meeting the requirements of this item and having the approval of the Architect or Soils Engineer. Crushed carbonate stone, crushed gravel, shall meet the following gradation requirements:

| <u>Sieve</u> | <u>Total Passing % By Weight</u> |
|--------------|----------------------------------|
| 2 inch       | 100                              |
| 1 inch       | 70 - 90                          |
| 3/4 inch     | 50 - 85                          |
| No. 4        | 25 - 60                          |
| No. 40       | 7 - 30                           |
| No. 200      | 0 - 15                           |

- G. Send copies of delivery tickets and mix spec to Architect/Owner.

## **PART 5 ASPHALT PAVING - EXECUTION**

### **A. SURFACE PREPARATION:**

1. Fine grade (grade will be + 0.1') furnish and install aggregate as required to "dress up" areas to be paved.
2. Proof roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction.

3. Notify Contractor of unsatisfactory conditions. Do not begin paving work until deficient sub-base areas have been corrected and are ready to receive paving.

**B. PLACING MIX:**

4. General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225° F (107° C). Place inaccessible and small areas by hand. Place each of two courses to required grade, cross-section, and compacted thickness.
5. Paver Placer: Place in strips not less than 10'-0" wide. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
6. Joints: Make joints, between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course.

**C. ROLLING:**

1. General: Begin rolling when mixture will bear roller weight without excessive displacement.  
Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
2. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
3. Second Rolling: Follow breakdown as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
4. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
5. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
6. Protection: After Final Rolling, do not permit vehicular traffic on pavement until it has cooled and hardened, 24 hours to cure.
7. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked, 24 hours to cure.

**D. TRAFFIC AND LINE MARKINGS:**

1. Cleaning: Sweep and clean surface to eliminate loose material and dust.
2. Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding Vyna-Stripe paint by Maintenance, Inc., Wooster, Ohio #(216) 264-6262.
  - Color: White
  - 4" lines and marking as shown on plans

**E. FIELD QUALITY CONTROL: (CONCRETE PLACEMENT)**

1. Surface Smoothness: Test finished surface of each concrete course for smoothness, using 10'-0" straightedge applied parallel with, and at right not to be acceptable is exceeding the following tolerances for smoothness:

\* Wearing Course Surface 3/16"

**F. ASPHALT PLACEMENT:**

1. Test finished surface of each asphalt course for smoothness, using 10'-0" straightedge applied parallel with, and at right angles to, centerline of paved area. Surfaces will not be acceptable for over 1" or greater deviation.

**G. PAINTING:**

1. Contractor shall layout and paint with one (1) coat the 4" lines and lettering as indicated on the plan. Lines shall be painted in solid lines of widths as noted on the drawings. Paint shall be applied only after the surface has cured. The edges shall be straight and clear. (All line white.)

**H. HANDICAPPED SIGNAGE (BY OWNER)****SECTION 02800. SITE IMPROVEMENTS****PART 1. GENERAL****1.01 WORK INCLUDED**

A. The extent of the site improvements is shown on the Site Plan.

B. Site improvements shall include the following:

1. Handicapped signage.
2. Concrete filled pipe bumpers.
3. Precast concrete bumper blocks.

**PART 2. PRODUCTS****2.01 MATERIALS**

A. Handicapped signage shall be supplied and installed by Owner.

B. 6" diameter steel pipe filled with 3,000 psi concrete with domed top set in concrete footing.

C. Precast concrete wheel stops shall be 6'-0" long and approximately 6" x 6" in section.

**PART 3. EXECUTION****3.01 INSTALLATION**

A. Handicapped signage shall be installed by Owner's set-up crew.

- B. Pipe bumpers shall be positioned as shown on the drawings and set in a 16" diameter footing to depths as specified on the drawings.
- C. Precast concrete wheel stops shall be anchored with at least two (2) steel drift pins at least 6" into pavement, and generally straddle two (2) parking spaces.

**SECTION 02900. LANDSCAPING**

- A. Check Owner's Responsibility List to see if it is included by General Contractor.

**SECTION 02910. WORK INCLUDED**

- A. Furnish labor and material to complete the Landscaping work as shown on the accepted plan by Owner.
- B. Performance of this work shall meet the requirements of the Specifications.
- C. The work covered by this section of Specifications consists of the following:
  - 1. Completing finish grading and spreading topsoil over area shown on plans.
  - 2. Providing grass sod or seed as shown on plans.
  - 3. Providing areas of gravel as shown on the plans.
  - 4. Providing and planting of trees and shrubs as shown on plans.
  - 5. Watering, cultivating and protecting the lawn and plantings until the final acceptance of the project.
  - 6. Providing written instructions for the care of newly installed landscape items, including procedures for watering, staking and any other necessary maintenance requirements.
  - 7. Provide weed barriers as noted on the plans: Typar or as specified on Landscape Plans.

**SECTION 02915. LANDSCAPE MATERIALS**

- A. All landscape materials shall be appropriate for the expected use and suitable to the local climate.
  - 1. Furnish and install all areas of new sod as indicated on the Landscape Plan. All sodding shall be of top quality, free from diseases and insects.
  - 2. Trees and shrubs shall be nursery grown, healthy and free from diseases and insects.
  - 3. Plantings of trees and shrubs shall be delivered balled and burlapped, and sized per Landscape Plans.
  - 4. Fertilizer shall be commercial fertilizer suited to local soil conditions.
  - 5. Mulch and stone beds shall conform to the depths as specified on the Landscape Plans.

**SECTION 02930. EXECUTION OF WORK**

- A. Spread topsoil over the entire areas scheduled for landscaping to a thickness called for in the Specification, but not less than 4 inches.
- B. Apply fertilizer at a rate recommended by the manufacturer for new lawn.

- C. All sodding shall be installed firmly in place and thoroughly watered upon installation. Newly seeded lawn areas shall be protected as required to allow seed to germinate and grow to a 1" height.
- D. Trees and shrubs: Excavation for planting shall be at least 6" deeper than the depth of root system, ball, or container. Width of the hole shall be at least one and one-half times the width of the ball or root spread.
- E. Backfill of planting shall be planting soil firmly compacted around the roots.
- F. Spread appropriate mulch material over the saucer around the planting.
- G. Complete landscaping during the appropriate season and under favorable weather conditions.
- H. Water and protect plantings and lawn until final acceptance of the project.
- I. All trees and shrubs shall be guaranteed for a period of one (1) year.

**SECTION 02931. ADDITIONAL WORK**

- A. This Contractor to submit alternate proposal for an underground, zoned, irrigation system. To include cost per head, number of zones, permit, backflow preventors, excavation, trenching, backfill, electrical work, maintenance proposal for Owner's review and acceptance. See page 10/1.

**DIVISION 3 CONCRETE****SECTION 03300. CAST-IN-PLACE CONCRETE****1.01 WORK INCLUDED****PART 1. GENERAL**

- A. Cast-in-place concrete shall include all material, labor and equipment necessary to place foundations and floor slabs, platforms, steps (including steel pan stairs if shown on drawings), ramps, footings and poured-in-place sidewalks.
- B. Extent of cast-in-place concrete is shown on Drawings.

**1.02 QUALITY ASSURANCE**

- A. Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.
  - 1. ACI 301-72 "Specifications for Structural Concrete for Buildings".
  - 2. ACI 381 "Building Code Requirements for Reinforced Concrete".
  - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

**PART 2. PRODUCTS****2.01 FORM MATERIALS**

- A. Form concrete surfaces with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least two (2) edges on one side for tight fit.

**2.02 REINFORCING MATERIALS**

- A. Reinforcing materials shall be as follows:
  - 1. Reinforcing bars (rebar) ASTM A 615, Grade 60, deformed.
  - 2. Steel wire, ASTM A 82, plain, cold-drawn steel.
  - 3. Welded wire fabric (WWF), ASTM A 185, welded steel wire fabric.

**2.03 CONCRETE MATERIALS**

- A. All concrete shall be supplied from a ready-mix batch plant in accordance with ASTM C 94.
- B. Portland cement shall be in accordance with ASTM C 150, Type 1. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- C. Normal weight aggregates shall be in accordance with ASTM C 33. Provide aggregates from a single source.

- D. Water shall be potable.
- E. All concrete for slab-on-grade shall have a compressive strength (f'c) of 4,000 psi at 28 days using minimum of six (6) sacks of cement per cubic yard, and a maximum slump of 4". Concrete for footings and grade beams shall have a compressive strength of 3,000 psi at 28 days using 5-1/2 sacks of cement per cubic yard.
- F. All concrete exposed to the weather shall receive an air entraining admixture. The total air entrained shall be maintained at 4% - 6% of the concrete by volume.
- G. Water reducing agents may be used for slab-on-grade only per ASTM C 494.
- H. Owner's and Architect's written permission needed to use calcium chloride on job.

#### **2.04 MISCELLANEOUS MATERIALS**

- A. Premolded expansion joint fillers shall be in accordance with ASTM D 1751 or ASTM D 1752.
- B. Vapor retarder:
  - 1. ASTM D2103-86, ten mil thickness polyethylene sheeting; ASTM E154-88 (1993) for serviceability; ASTM E96-95, Procedure A, 0.090 perms (U.S. Perms).
  - 2. Adhesive or tape: Acceptable to manufacturer of vapor retarder material.
- C. Liquid curing compound shall be in accordance with ASTM C 309. Subject to compliance with requirements, provide one (1) of the following:
  - 1. "Masterseal"; Master Builders.
  - 2. "Ecocure"; Euclid Chemical Co.
  - 3. "Clear Seal"; W.R. Grace.
- D. Epoxy crack filler, acceptable products:
  - 1. ChemRex Inc.; Sonneborn® Epolith-P.
  - 2. Pecora Corp.; EP-800.
  - 3. Schul International Company; Joint-Loc 80.

### **PART 3. EXECUTION**

#### **3.01 FORMS AND FORM WORK**

- A. General: The design and engineering of all form work, as well as its construction, shall be the responsibility of the Contractor. Forms and centering shall be built to the shapes and dimensions of the concrete as shown on the drawings. Forms shall be set to line and grade, braced and secured to withstand the placing of the concrete and maintain their shape and position. Forms shall be constructed with care to produce concrete surfaces which will require a minimum of trimming of the finish and which will not leave unsightly or objectionable form marks in exposed concrete surfaces. Lumber once used as forms shall have all loose nails withdrawn and contact surfaces thoroughly cleaned before reused.

- B. **Shoring:** Horizontal surfaces shall have adequate shoring to support concrete loads and construction loads without deformation. Positive means of adjustment (wedges or jacks) of shores and struts shall be provided and all settlement shall be taken up during concrete placing operations. They shall be securely braced against lateral deflections.
- C. **Design, erect, support, brace and maintain formwork** to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- D. **Provide and install steel sleeved openings** in concrete formwork to accommodate work of other trades. Determine size and locations of openings, recessed and chases from trades providing such items. Accurately place and secure support items built into frame.
- E. **Cleanout Pockets:** Temporary openings shall be arranged in wall, beam and column forms and where otherwise required to facilitate cleaning and inspection.
- F. **Form ties** shall be used to securely hold forms in position during the placing of concrete and to withstand the weight and pressure of the wet concrete and other loads incidental to construction. In no case will wire ties be permitted for use in holding form in place.
- G. **Coating:** Forms for surfaces not exposed to view or normal weathering may be thoroughly wetted with water or form oil. In cold weather, with probable freezing temperature, form oil shall be mandatory.
- H. **Removal of Forms for Cast-in-Place Concrete:** Forms shall not be disturbed until the concrete has hardened sufficiently to permit their removal with safety. Shoring shall not be removed until the member has acquired sufficient strength to support safely its own weight and the loads upon it. Members subject to additional loads during construction shall be adequately shored to support both the member and construction loads in a manner that will protect the member from any damage. Forms for beam bottoms and slabs may be removed when cylinder tests show that the concrete has obtained at least 75% of its required compressive strength. Side forms may be removed after thirty (30) hours. Wood forms shall be completely removable from behind walls, under steps and similar places (through temporary openings if necessary) in order that no material will be left to rot or become infested by termites.

### 3.02 PREPARATION FOR PLACING CAST-IN-PLACE CONCRETE STRUCTURAL SLABS (IF ANY) AND RETAINING WALLS (IF ANY):

- A. **Inserts:** The various trades shall be given ample time to install all anchor bolts, hangers, sleeves, conduits and inserts necessary for the proper execution of their work. All items shall be accurately positioned in the forms. Sleeves shall extend 1" above finished floor to prevent water from leaking down around the sleeve. No reinforcing steel shall be cut to facilitate installation of inserts.



- B. Preparation: Impounded water shall be removed from the forms and excavations before any concrete is deposited. Debris shall be removed from the space to be occupied by the concrete. Hardened concrete and all foreign substances shall be removed from the inner surfaces of the mixing and conveying equipment. Wood forms, unless lined, shall be wetted with water in advance of pouring the concrete, to tighten the joints and prevent seepage of cement from the mix, or the absorption, by the forms of the water in the concrete. Substantial runways or other suitable means, shall be provided over which to convey the concrete to the several points of deposit, in order not to disturb the forms or reinforcements, and conveying equipment shall not be wheeled directly over any reinforcement.
- C. Installation of Vapor Barrier: Fill shall be smooth and any protrusions that might damage or rupture the vapor film shall be lapped not less than 6" with the top lap placed in the direction of the spreading concrete. Use pressure sensitive tape at all laps of vapor barrier. Tape shall be a minimum of 2" wide and shall have same per rating as vapor barrier material. Lay reinforcement directly over the film prior to placing the concrete, taking any precautions to prevent film punctures. Carefully cut film around pipes and conduits and then apply pressure sensitive tape around these protrusions to insure maximum barrier effectiveness.

### 3.03 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's and ACI's recommended practice for placing reinforcing bars, for details and methods of reinforcement placement and supports, and as herein specified.

### 3.04 JOINTS

- A. Locate and install construction control and expansion joints, if not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to the Architect. Under no circumstances is a joint to be placed in the lobby area or the middle of a guest room.
- B. Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footing; accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

### 3.05 INSTALLATION OF EMBEDDED ITEMS

- A. Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached.

- B. Provide trench drain and a two piece lightweight iron grate with holes provided for drain hoses from washers in the laundry area, 6" away from the laundry water heater room wall and centered in front of this wall section. (Grate by Metals Contractor) Coat entire trench with self-leveling epoxy filler (color: gray) as manufactured by Micor Company, Inc., 3232 North 31st Street, Milwaukee, WI 53216, #(414) 873-2071.

### 3.06 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
- C. Place concrete in accordance with ACI 301. Concrete shall be delivered to the place of pouring by trucks or carts and poured through troughs or chutes. Avoid any fall, segregating the coarse aggregates from the mix. Tamp the concrete in place, manually or by mechanical vibrators until voids have been eliminated and a compact consistency achieved.
- D. Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 301.
- E. Earth cuts may be used as forms for footing vertical surfaces, if sides are sharp and true, and not exposed in finished structure.
- F. The tolerances specified in ACI Table 4.3.1 shall apply to all buildings unless more restrictive tolerances are specified elsewhere in these specifications or on the drawings.

### 3.07 SLABS-ON-GRADE

- A. Concrete floor slabs shall be placed over a well tamped earth subgrade. Over subgrade place a minimum thickness of 4" of granular and/or sand base. Tamp base until thoroughly compacted. Place 10-mil. polysthylene vapor barrier over granular and/or sand base. Lap all edges of vapor barrier at least 6" and cement joints. Immediately place concrete of required thickness and strike off at proper levels to receive finishes specified. All slabs to be reinforced with a minimum 6 x 6 10/10 w.w.m. unless otherwise stated on plans.
  - 1. Slabs on grade shall be 4" thick unless otherwise indicated on the Drawings.
  - 2. Exterior walks and platforms to have lite broom finish perpendicular to flow of traffic.
  - 3. Use rounded toll for edges and joints in sidewalks and side form edges with metal or wood.
  - 4. 6" isolated slab at lobby to have fiber mesh additive.
  - 5. Post tensioned floor slab shall follow strict compliance to specifications on structural drawings for tension cables, sequence, concrete strength, caissons, and other footings.
- B. Apply float finish to all slab surfaces to receive trowel finish and other finishes as specified.

- C. Apply trowel finish to all slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, paint or other thin film finish coating system.
- D. Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
- E. Concrete Floor Slab Finishes: Build concrete floor slabs to uniform plane surface with a tolerance of 1/8" in ten (10) feet. Pitch slabs to drains where indicated; pitch shall be one inch (1") to ten feet (10'-0").
  - 1. First floor slabs shall have a true floated integral cement finish. Dusting of wearing surfaces with dry materials is not permitted. Tamp concrete to force aggregate away from surface and then screed at proper level. Surface shall then be floated and lightly troweled. When concrete has set sufficiently to ring under the trowel, it shall be given a second troweling to produce a smooth dense surface.

### 3.08 CONCRETE CURING AND PROTECTION

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Apply curing compound uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing.
- C. Curing and Protection: Protect all concrete work from drying out after removal of forms by covering with waterproof paper, polyethylene sheeting, burlap, or an approved membrane curing compound, applied on accordance with the manufacturer's instructions. Wet burlap as often as required to keep concrete wet through each day for a period of at least 7 days where normal portland cement is used.
  - 1. In cold weather provide heated concrete in accordance with ASTM C 94 and follow procedures as outlined in "Recommended Practice for Cold Weather Concreting" ACI 604. The Contractor shall take whatever precautions are necessary to prevent damage to foundations and interior building slabs on grade resulting from heaving of ground due to frost during construction. Up to 1% calcium chloride will be allowed for cold weather concreting with Owner's and Architect's written permission.
  - 2. Hot Weather Concreting: Follow the recommendations of "Recommended Practice for Hot Weather Concreting" ACI 605.
- D. Concrete Curing and Sealing Agent: All concrete floor slabs shall receive concrete curing and sealing agent within 12 -24 hours after placement.
  - 1. Apply coat of sealer at the rate of 400 sq. ft. per gallon after final troweling and/or finishing, and before surfaces receive any traffic.

### 3.09 CONCRETE REINFORCEMENT

- A. GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS AND SPECIAL CONDITIONS: Are hereby made a part of this Section.

B. Scope: Furnish all labor, materials, services and appliances required for the installation of all reinforcing for all cast-in-place concrete work as shown and/or noted on the plans and as described herein.

C. Materials:

1. Reinforcing bars shall be of domestic manufacture and shall conform to the requirements shown on the drawings. Each piece of reinforcing shall be mill marked by stamping or as part of the rolling impressions designating the type of steel bar is rolled from. Bars shall conform to the requirement of "Specifications for Billet-Steel Concrete Reinforcing Bars", ASTM A 615, with grade and size, as noted on the drawings.
2. Welded wire fabric shall be domestic manufacture and shall conform to the requirements of the "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", ASTM A 185.
3. Miscellaneous Accessories: Chairs, spacers and other supports required shall conform to the requirements of the A.C.I. Detailing Manual (A.C.I.-315). Supports for reinforcing for exposed concrete surfaces shall be galvanized or plastic coated.

D. Reinforcing Steel:

1. General: Reinforcing steel, fabricated in shapes and dimensions shown, shall be placed where indicated on drawing, and Specifications. Details of reinforcing shall conform to the standards of the A.C.I. Detailing Manual (A.C.I.-315). Bars shall be plainly marked with metal tags for location. Before being placed in the work, reinforcing shall be thoroughly cleaned of rust, mill scale, dirt, oil or other coatings, which might tend to reduce the bonding of the concrete thereto.
2. Bending: Bars shall be bent cold. Heating of reinforcement, or bending by makeshift methods, will not be permitted and bars having kinds or bends not required shall not be used.
3. Placing: Reinforcement shall be accurately placed and securely saddle tied at every intersection with No. 16 gauge black annealed wire, and shall be rigidly held in place during the placing of the concrete by means of metal chairs or spacers) not wood blocks or brick bats), as recommended by (A.C.I.-315). Reinforcing steel in grade beams and walls, unless otherwise specifically noted on the drawings shall be bent around corners and extend 30 diameters into the adjoining walls or beams.
4. Splicing: Bars shall be lapped 30 diameters at splices unless otherwise shown. Stirrups in beams shall be wired to the principal reinforcing bars. In splicing welded wire fabric, the lap in both directions shall not be less than the distances between the wires. The two transverse wires for any splice as well as the longitudinal wires shall be securely tied.
5. Dowels: Are to be embedded 30 diameters, unless otherwise shown on the drawings.
6. Concrete Protection for Reinforcement: Reinforcement shall be protected by the thickness of concrete indicated in the drawings. Where not shown, the thickness of the concrete over the reinforcement shall be as follows:

Where concrete is exposed to weather, or exposed to the ground, but placed in forms.

Not less than 2" for bars larger than No. 5; nor less than 1-1/2" for No. 5 bars or smaller.

At surfaces not exposed to the ground or the weather.

Not less than 3/4" for slabs and walls, or 1-1/2" for beams.

### 3.10 FOUNDATION DAMPPROOFING (Elevator Pit)

- A. Pipes and pipe sleeves passing through foundation walls shall be flashed with 2 plies of saturated fabric embedded in dampproofing and extending 6" onto pipe and 6" on wall.
- B. Slab-on-grade Vapor Barrier: Provide and install, under all concrete floor slabs on grade inside the building a vapor barrier course laid over the sand base specified. This vapor barrier shall be 10-mil. polyethylene vapor barrier. The vapor barrier shall be laid immediately before and only as concrete can be placed. Sheets shall be lapped 6" and fitted tightly against walls around columns, pipes, etc. Avoid puncturing material while placing concrete as damaged material must be replaced. The sand base, specified previously, shall be compacted smooth and level before vapor barrier is placed.
- C. Also see Section .07700, Dampproofing.

### 3.11 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The Contractor is to employ an independent testing laboratory to perform concrete testing.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by the Architect:
  - 1. Slump: ASTM C 143, one test for each concrete load at point of discharge.
  - 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; one for each set of compressive strength test specimens.
  - 3. Concrete Temperature: Test hourly when air temperature is 40° F (4° C) and below, and when 80° F (27° C) and above; and each time a set of compression test specimens are made.
  - 4. Compression Test Specimens: ASTM C 31, one set of six (6) standard cylinders for each compressive strength test, taken from each concrete load. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
  - 5. Compressive Strength Tests: ASTM C 39, two (2) specimens tested at seven (7) days, two (2) specimens tested at 28 days. Must meet 2000 psi requirement. Copies of test results are to be sent to the Architect and the Owner.

### **SECTION 03541. GYPSUM UNDERLAYMENT**

- A. Furnish and install 3/4" thick Gyp-Crete 2000 floor underlayment over entire 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> floors and as directed on the drawings (to be installed only after drywall has been installed and under tub on all floors except first).
- B. General Summary
  - 1. Section Includes
    - a. Gyp-Crete gypsum cement
    - b. Gyp-Crete Floor Primer
    - c. Gyp-Crete Overspray

**2. Quality Assurance**

- a. **Installer's Qualifications:** Installation of Gyp-Crete shall be by an applicator authorized by the Gyp-Crete Corporation using Gyp-Crete approved mixing and pumping equipment.

**3. Delivery, Storage and Handling**

- a. **General Requirements:** Materials shall be delivered in their original, unopened packages, and protected from exposure to the elements. Damaged or deteriorated materials shall be removed from the premises.

**4. Site Conditions**

- a. **Environment Requirements:** Before, during and after installation of Gyp-Crete, building interior shall be enclosed and maintained at a temperature above 50° F (10°C).

**C. Products****1. Materials**

- a. **Gyp-Crete Cement:** Floor underlayment Gyp-Crete 2000 gypsum cement as manufactured by the Gyp-Crete Corporation, Hamel, MN #(800) 356-7887.
- b. **Sand Aggregate:** Sand shall be 1/8" or less, washed masonry or plaster sand, meeting requirements of Gyp-Crete Corp. specifications.
- c. **Mix Water:** Potable, free from impurities.
- d. **Subfloor Primer:** Gyp-Crete Floor Primer.
- e. **Primer:** Gyp-Crete Overspray or Gyp-Crete Floor Primer.

**2. Mix Designs**

- a. **General Requirements:** Mix proportions and methods shall be in strict accordance with product manufacturer recommendations.
- b. **Mix Proportions:** 2.1 mix design -- this mix design is in multifamily housing projects, it's equivalent to 2.1 cubic feet of sand per 80 pound bag of Gyp-Crete.

**D. Execution****1. Preparation**

- a. **Condition and Cleaning of Subfloor:** Subfloor shall be structurally sound. General Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors before the arrival of the Gyp-Crete underlayment crew.
- b. **Leak Prevention:** Fill cracks and voids with a quick setting drywall patching material where leakage of Gyp-Crete could occur.
- c. **Priming Subfloor:** Prime subfloor using the Gyp-Crete Floor Primer. Priming instructions may vary according to the type of substrate, multiple coats may be necessary.

**2. Application of Cementitious Flooring**

- a. **Scheduling:** Application of Gyp-Crete 2000 shall not begin until building is enclosed, including roof, windows, doors, and other fenestration. Install after drywall installation.
- b. **Protect drywall during installation and leave drywall in condition ready to paint.**
- c. **Application:** Place Gyp-Crete 2000 at 3/4" minimum over wood frame, 1/2" minimum over plank or poured in place concrete. Spread and screed Gyp-Crete 2000 to a smooth surface. Except at authorized joints, place Gyp-Crete 2000 as continuously as possible until application is complete so that no Gyp-Crete product slurry is placed against Gyp-Crete product that has obtained its initial set.

- d. Drying: General Contractor shall provide continuous ventilation and adequate heat to rapidly remove moisture from area until Gyp-Crete is dry. General Contractor shall provide mechanical ventilation is necessary. Under the above conditions, for 3/4" thick Gyp-Crete 5 to 7 days is usually adequate drying time. To test for dryness, tape a 24" x 24" section of plastic to the surface of the underlayment. After 48 to 72 hours, if no condensation occurs, the underlayment shall be considered dry. Perform dryness test after 5 - 7 days after pour.
- 3. Preparation for Installation of Glue Down Goods.
  - a. Priming: Prime all areas that receive glue down floor goods according to the Gyp-Crete Corp. specifications. Any floor areas where the surface has been damaged or dusting shall be cleaned and primed regardless of floor covering to be used. Use Gyp-Crete Floor Primer or Gyp-Crete Overspray to prime the Gyp-Crete prior to installation of glue down goods. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.
  - b. Floor Goods Procedures: See the Gyp-Crete Corp. "Procedures for Attaching Finished Floor Goods to Gyp-Crete Underlayments" brochure for guidelines.
- 4. Field Quality Control
  - a. Slump Test: Gyp-Crete mix shall be tested for slump as it's being pumped using a 2" by 4" cylinder resulting in a patty size of 8" (+/- 1") diameter.
  - b. Field Samples: At least one set of 3 molded cube samples shall be taken from each pay's pour during the Gyp-Crete application. Cubes shall be tested by the Gyp-Crete Corp. in accordance with ASTM C 472. Test results shall be available to Architect, Owner and/or Contractor upon request from applicator.
- E. The only Architect/Owner accepted alternate for this acoustical topping shall be Mealcrete as manufactured by the Meal Corporation of Roselle Park, NJ, #(908) 245-9500, as long as all the density, fibermesh reinforcement, finish, sealing, etc. specifications contained herein are adhered to.
- F. Warranty: Provide Owner with manufacturer's warranty for a period of five (5) years.

**DIVISION 4 MASONRY****SECTION 04010. WORK INCLUDED (LIMITED APPLICATION)**

- A. Furnish labor and materials to complete masonry work shown and specified (including refuse enclosure).
- B. Mason Contractor to furnish and install the hollow metal door frame and door to be set into masonry walls as shown on the Drawings. (See also specification on hollow metal products.)

**SECTION 04013. GENERAL**

- A. Do not erect masonry when ambient temperature has dropped below 45° F unless it is rising, at no time when it has dropped below 40° F except by written permission. When masonry work is authorized during temperature below 40° F, make provisions for heating, drying, materials and protecting in-place masonry construction.
- B. Lay masonry plumb, true to line, with level, accurately spaced courses. Keep bond throughout. Lay corners, reveals plumb, true.
  - 1. Use masonry saw for cutting masonry units.
  - 2. Cutting, patching or masonry required to accommodate work of others, use masonry mechanics.
  - 3. Step back unfinished work for joining with new work. Toothing will not be permitted. Before new work is started, remove loose mortar; expose joint, wet thoroughly at least 12 hours before laying new work.
- C. Consult other trades and make provisions that will permit the installation of their work in a manner to avoid cutting and patching. Build in work specified in other Divisions, as necessary, as the work progresses. Set steel lintels weighing less than 500 pounds. Set lintels in beds of mortar. Fill spaces around jambs and heads of metal door buck and frames, solidly with mortar. Build in anchors and clips as required for metal door frames.
- D. Protect masonry surfaces not being worked on during construction work. At such time as rain is imminent, work is discontinued, protect work with waterproof membrane, well secured.
- E. Verify all coursing heights against project superintendent's story pole prior to starting any work.

**SECTION 04100. MORTAR**

- A. This section encompasses materials, proportioning, and mixing of mortars and masonry cements.
- B. Cement:
  - 1. Water: Clean and potable.
  - 2. Cement:



- a. Portland Cement: Standard American Brand, Type "S".
  - b. Masonry Cement: Standard American Brand, ASTM C 91, Type 11, Atlas, Lehigh, Medusa.
  - c. All mortar regardless of type is to yield 2,200 psi in 28 days.
  - 3. Hydrated Lime: ASTM, C 207-49, Type S, Mason's hydrate of finishing lime.
    - a. Lime Putty: Made from hydrated lime. Mix dry hydrated lime with water to form stiff plastic putty. Keep putty moist until used.
  - 4. Sand:
    - a. For masonry work: ASTM C 144, approved color. Grade sand from course to fine, with grains predominating as per:
      - (1) For joints of average thickness, such as for brick work and block work, 100% sand pass 8 sieve, not over 15 to 40% pass 50 sieve.
      - (2) For thin joints for units of cut or ground edges, 100% sand pass 16 sieve, not over 15 to 40% pass 50 sieve.
    - b. For pointing masonry work: As specified for masonry work, except for joints 1/4" to 3/8" sand pass 12 sieve for finer, pass finer sieve.
- C. Mortar Preparation: Use method of measuring materials on job so that specified proportions of mortar materials can be controlled, accurately maintained during work progress. No shovel measurements permitted.
- 1. Prepare mortars in which Portland and other quick-setting cements are used in batches of volume that will be used before initial set takes place, in no case longer than 45 minutes before delivering to masons' mortar boards at points of use. Retamping is not permitted.
  - 2. Except as otherwise approved for small batches, do mixing in mechanically operated batch mixers of drum type in which water can be accurately, uniformly controlled.
  - 3. Mortar Proportions (By Volume):
    - a. Cement, Lime Mortar:
      - 1 part portland cement
      - 2 parts lime putty or hydrated lime
      - 4 parts sand
    - b. Class "C-2" Mortar (Alternate to a.):
      - 1 part masonry cement
      - 2 parts sand (Use white sand in pointing mortar for cut stone)
- Add sufficient lime putty of hydrated lime to make as stiff as can be worked.

#### **SECTION 04150. ACCESSORIES**

A. This section encompasses accessory items required for masonry work.

#### **SECTION 04151. JOINT REINFORCEMENTS**

A. Reinforcement for Concrete Masonry:

1. "Dur-O-Wal" standard reinforcing having 2 - 9 gauge side rods and 9 gauge cross rods, as manufactured by Dur-O-Wal; standard "Blok-Trus" having 2 - 9 gauge side rods and 9 gauge cross rods, as manufactured by A.A. Wire Products Company.
  - a. Width of reinforcement to be 2 inches less than wall thickness.
  - b. Reinforcement to be hot dipped galvanized after fabrication.

## **SECTION 04210. BRICK AND CONCRETE UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.01 SYSTEM DESCRIPTION**

- A. Design requirements for veneers; Seismic Performance Category required by local code.
- B. Performance requirements: Follow NCMA; TEK 18-3A for Level 2 Quality Assurance for masonry work.

#### **1.02 SUBMITTALS**

- A. Quality control submittals:
  1. Quality control program:
    - a. Submit quality control program including procedures and techniques for tests and observation in accord with NCMA TEK 18-3A indicated above for "Level # Quality Assurance indicated below, NCMA Level 1 is required as minimum.
    - b. Include the following information.
      - 1) Organization responsibilities.
      - 2) Materials control.
      - 3) Inspection.
      - 4) Testing and evaluation.
      - 5) Identification and resolution of noncomplying conditions.
      - 6) Records.
    - c. Test reports; types required by indicated Quality Assurance Level:
      - 1) Units testing (CMU): ASTM C140-96b.
      - 2) Mortar: ASTM C780-96.
      - 3) Grout: ASTM C1019-89a.
      - 4) Prisms: ASTM C1314-97.

#### **1.03 QUALITY ASSURANCE**

- A. Mock-ups:
  1. Lay 6'-0" long by 4'-0" high sample wall panel of face brick using mortar specified in other sections. Orient panel as directed by Architect.
  2. Indicate the following:
    - a. Brick color and texture; each specified unit.
    - b. Bonding and reinforcement.
    - c. Mortar color(s) and joint tooling.
    - d. Control joint complete with joint sealant.
    - e. Workmanship.
    - f. Reinforcement.
    - g. Flexible flashing
  3. Prepare panel at least 14 days prior to beginning masonry work. Should panel be disapproved, prepare additional panels until approved by Architect.
  4. Maintain panel throughout work as standard of masonry work. Do not destroy panel until directed by Architect.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection: Cover brick with nonstaining canvas tarps or breathable cover until used. Recover units remaining in storage during nonworking hours.

#### 1.05 PROJECT CONDITIONS

##### A. Environmental requirements:

1. Prohibited practices, general:
  - a. Cold weather installation:
    - 1) Laying brick when temperature of surrounding air has dropped below 40°F unless temperature is rising.
    - 2) Laying brick when temperature has dropped below 40°F. and temperature of brick is below 40°F. is prohibited,
  - b. Hot weather installation:
    - 1) Spreading mortar beds more than 4'-0" ahead of brick.
    - 2) Setting brick more than one minute of spreading mortar.
2. Brick installed during conditions outlined above: Strictly follow precautions outlined below for appropriate weather conditions. Notify Architect, in writing, indicating below outlined procedures will be followed.
3. Cold weather precautions for Architect authorized masonry work:
  - a. Do not lay brick having temperature below 20°F.; remove visible ice on brick before unit is place in wall.
  - b. Ambient temperature requirements:
    - 1) 40°F. and 32°F.: Heat mortar sand or mixing water to produce mortar temperatures between 40°F. and 120°F. at time of mixing; maintain mortar temperature above freezing until placed.
    - 2) 25°F. and 20°F.: In addition to "1" above, use heat sources on both sides of masonry under construction; install wind breaks when wind velocity is in excess of 15 MPH.
    - 3) Below 20°F.: In addition to "1" above, provide enclosure for masonry under construction; use heat sources to maintain temperatures above 32°F. within enclosures.
  - c. Daily mean temperature requirements:
    - 1) 40°F. and 32°F.: Protect completed masonry from rain or snow by covering with weather resistive membrane for 24 hours, minimum, after construction.
    - 2) 32°F. and 25°F.: Completely cover completed masonry with weather resistive membrane for 24 hours, minimum, after construction.
    - 3) 25°F. and 20°F.: Completely cover completed masonry with insulating blankets or equal protection for 24 hours, minimum, after construction.
    - 4) Below 20°F.: Maintain masonry construction above 32°F. for 24 hours after completion by enclosure with supplementary heat, electric heating blankets, infrared heat lamps, or other acceptable methods outlined to Architect.
4. Hot weather precautions: Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 100°F. or ambient air temperature of 90°F. with wind velocity in excess of eight MPH.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURED UNITS

#### A. Face brick:

1. Quality: ASTM C216-95, Grade SW, Type FBS.
2. Size: Modular; 2¼" high by 3-5/8" deep by 7-5/8".
3. Face brick:  
See plans for brick selection.
4. Special shapes: Include, but not limited to, special fabricated watertables, arches, and solid units.

#### B. Concrete Masonry Units: Free of deleterious matter that will corrode metal; cured adequately before shipment; FS, SS-C-621, except that moisture in units at time of delivery to job not exceed 30% maximum absorption value of units, when tested as per par. F-2C of referenced FS. Smooth faced units: Free from rough edges, spalls or other defects.

1. Class A: Concrete using ordinary aggregate, weighing over 150 lbs. per cu. ft. (Concrete Block). Used for all building and building structures.
2. Units: Standard sizes, shapes; include closures, jamb, other shapes required by construction as indicated.

### 2.02 ACCESSORIES

#### A. Weep and cavity materials: Specified in Masonry Accessories Section.

#### B. Masonry cleaning compound, acceptable products:

1. Normal: ProSoCo, Inc.; Sure-Klean 600 Detergent.
2. Red and other dark colored brick: ProSoCo, Inc.; No. 101 Lime Solvent.
3. Soft burned white, gray, or brown brick or metallic oxidation stains: ProSoCo, Inc.; Van Trol®.
4. Metallic oxides: ProSoCo, Inc.; Ferrous Stain Remover.
5. Vanadium salt stains, acid burn, and metallic oxidation stains: ProSoCo, Inc.; 800 Stain Remover.
6. Insoluble salt stains: ProSoCo, Inc.; White Scum Remover.

#### C. Mortar: Type "N", colored mortar; specified in Masonry Mortar Section.

#### D. Wall ties: Specified in Masonry Anchorage and Reinforcement Section.

#### E. Lintels: Galvanized steel; specified in Metal Fabrications Section.

#### F. Cavity wall flashing: Specified in Flexible Flashing Section.

#### G. Backer rods and sealants: Specified in Joint Sealants Section.

## PART 3 - EXECUTION

### 3.01 PREPARATION

#### A. Protection:

1. Keep walls dry during erection by covering at end of each work period with non-staining waterproof membrane covering.

2. Protect partially completed walls not being worked on with non-staining waterproof membrane until construction activities specified in other sections completes protection of walls.
3. Covering: Overhang at least 2'-0" on each side of wall; anchor on each side of wall.
4. Protect finished exposed work from stains.
5. Remove misplaced mortar or grout immediately.
6. Protect face materials against staining.
7. Protect sills, ledges, and offsets from mortar droppings during construction.

### 3.02 INSTALLATION

#### A. Workmanship:

1. Installation of cracked, broken, or chipped units exceeding ASTM allowances is prohibited.
2. Use abrasive power saws to cut brick. Avoid slivers less than 2" wide.
3. Lay brick plumb, true to line, and with level courses; space within allowable tolerances.
4. Furrowing bed joints is prohibited.
5. Stop off horizontal run by racking back in each course; toothing is prohibited.
6. Adjust units to final position while mortar is soft and plastic.
7. Units displaced after mortar has stiffened: Remove, clean joints and units of mortar; relay with fresh mortar.
8. Cut and patch finish masonry to accommodate work of other sections without marring finished surface appearance.
9. Adjust shelf angles to keep work level and at proper elevation.
10. Mix units from pallets in work to diminish noticeable variation in color and texture between pallets.
11. Install pressure relieving joint material continuous by adhering material under shelf angles and required locations.
12. When joining fresh masonry to set or partially set masonry, remove loose brick and mortar; clean and dampen exposed surface of set masonry prior to laying fresh masonry.
13. Keep cavity clean of mortar; trowel protruding mortar fins in cavity flat to inner wythe face.

#### B. Building in other work:

1. Build in work of other sections indicated to be built-in with brick as work progresses; include anchors, wall plugs, expansion joints, and accessories. Space and align built-in parts; exercise care not to disturb other materials from position.
2. Fill hollow metal frames in brick masonry walls with fine grout as wall is laid. Rake back ½" joint between hollow metal frame and adjacent brick to receive sealant.

#### C. Mortar beds:

1. Lay brick with full mortar coverage on horizontal and vertical joints in courses.
2. Install sufficient mortar on ends of brick to fill head joints.
3. Rock closures into place with head joints thrown against two adjacent bricks already in place.
4. Do not pound corners or jambs to fit stretcher units after setting into place.
5. Remove mortar and replace with fresh mortar where adjustment to corners or jambs must be made after mortar has started to set.

- D. Mortar joints:
  1. Nominal thickness: 3/8".
  2. Tool joints exposed in finished work when "thumb print" hard; use round jointer slightly larger than joint width.
  3. Use plexiglass or stainless steel tool to compact joints where white or light colored mortar is used.
  4. Tool joints: Concave.
  5. Trowel point or concave-tool joints below grade.
  6. Flush cut joints not to be exposed in finished work or otherwise tooled.
- E. Bonding pattern: Lay brick in common running bond, soldier, rowlock, and other special patterns indicated.
- F. Control joints:
  1. Keep clean of mortar and debris.
  2. Install control joint material specified in Masonry Accessories Section continuous.
  3. Make joints 3/4" wide unless otherwise indicated.
  4. Space control joints as indicated but in no case more than 25'-0" O.C..
  5. Coordinate location of control joints in brick masonry.
- G. Expansion joints:
  1. Keep clean of mortar and debris.
  2. Make joints 1" wide unless otherwise indicated. Stop horizontal joint reinforcement 1" each side of joint.
- H. Wall ties: Install in accord with requirements of Masonry Anchorage and Reinforcement Section.
- I. Cavity wall flashing:
  1. Clean masonry surfaces smooth; maintain free from projections capable of puncturing flashing material.
  2. Place flexible flashing on bed of mortar; cover with mortar.
  3. Follow requirements indicated in Flexible Flashing Section.
- J. Weep holes:
  1. General:
    - a. Install weep holes in exterior masonry wythe at 2'-0" O.C. horizontally at heads and sills of openings, in exterior walls at grade, and locations where flashing is indicated.
    - b. Keep weeps and area above flashing free of mortar droppings.
  2. Wicks: Form weeps by placing 16" long pieces of rope wick in mortar joints, extending into cavity. Leave wicks in place; cut off flush with wall face.
  3. Cavity french drain construction:
    - a. Base installation method on material selection in ACCESSORIES Article.
    - b. Coarse aggregate: Place 3" depth washed pea gravel continuous in cavity at flashing forming "French Drain" to protect weep system from excess mortar droppings for either weep system selected; dam edges at flashing termination to hold gravel in place. Place gravel when brick units are not more than two courses above weep material.
    - c. Drainage mat material: Cut mat material approximately 1/2" wider than cavity; set mat at angle sloping to inner wythe face and continuous at flashing when brick units are not more than two courses above weep material.
- K. Sealant joints: Retain 1/2" deep by 1/4" wide sealant joint around outside perimeter of exterior doors, window frames, and other wall openings.

- L. Pointing: Cut out defective mortar joints and holes in exposed work. Repoint with new mortar.
- L. Dry cleaning: Brush brick masonry surfaces with stiff bristle brush. Do not allow mortar droppings to harden on exposed surfaces.
- N. Provide perimeter insulation: Styrofoam SM Brand insulation 1 ½" thick. Apply to entire interior surface of concrete block foundation wall, except top course, using #7 Styrofoam adhesive.

### 3.03 APPLICATION

#### A. Tolerances:

1. Maximum variation from plumb:
  - a. In lines and surfaces of walls and arises:
    - 1) ¼" in 10'-0".
    - 2) 3/8" in any story or 20'-0" maximum.
    - 3) ½" in 40'-0" or more.
  - b. For external corners, expansion joints, and other conspicuous lines:
    - 1) ¼" in any story or 20'-0", maximum.
    - 2) 3/8" in 40'-0" or more.
2. Maximum variation from level or grades for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
  - a. ¼" in any bay or 20'-0".
  - b. ½" in 40'-0" or more.
3. Maximum variation of linear building line from established position in plan and related portions of columns, walls, and partitions:
  - a. ½" in any bay or 20'-0".
  - b. ¾" in 40'-0" or more.
4. Maximum variation in cross-sectional dimensions of columns and thickness of walls: Not less than ¼" smaller nor more than ½" larger than indicated.

### 3.04 CLEANING

#### A. General:

1. Remove stains in accord with recommendations of Brick Institute of America, Technical Notes #20 REV, Reissued June 1987. Use cleaning agents only after pre-testing on sample panel.
2. Test panel:
  - a. Apply solution on half of surface of mock-up panel at least 21 days prior to application of cleaning solution to brick.
  - b. Should discoloration of brick or mortar joints, staining, or efflorescence appear on sample panel, notify Architect in writing; await further instructions.
3. Wet cleaning within seven days of placing masonry is prohibited.

#### B. Preparatory work:

1. Protect materials adjacent brick masonry subject to corrosion from contact with cleaning solution.
2. Saturate mortar joints with clean water; flush off loose debris at least two hours prior to cleaning solution application to brick.

#### C. Manufactured cleaning compound:

1. Apply on brick masonry as tested on mock-up panel in accord with manufacturer's product data; flush with clean water.

2. Begin cleaning process at highest point of wall, working downward. Work in areas of 20 SF, maximum. Flush wall with clean water as cleaning progresses to prevent accumulation of scum.
3. Scrubbing mortar joints with cleaning solution is prohibited.

D. Safely discard solutions containing debris and residue.

#### **SECTION 04211. CONCRETE UNIT MASONRY**

- A. Perform concrete unit masonry work where shown on the Drawings and as specified.
- B. Concrete Masonry Units: Free of deleterious matter that will corrode metal; cured adequately before shipment; FS, SS-C-621, except that moisture in units at time of delivery to job not exceed 30% maximum absorption value of units, when tested as per par. F-2C of referenced FS. Smooth faced units: Free from rough edges, spalls or other defects.
1. Class A: Concrete using ordinary aggregate, weighing over 150 lbs. per cu. ft. (Concrete Block). Used for all building and building structures.
  2. Units: Standard sizes, shapes; include closures, jamb, other shapes required by construction as indicated.
- C. Workmanship.
1. Erect concrete masonry unit walls, partitions, where indicated. Butter joints on outer edges only. Butter vertical joints entire height of units. Bond each course at corners and intersections; anchor to adjacent construction with metal anchors or horizontal reinforcing. Place steel reinforcement in first and second bed joint (8" c. to c.). 16" o.c. throughout the remainder of the concrete masonry work. Lay reinforcing on wall; cover with mortar; bed unit. At corners, cut rod and bend to proper angle.
    - a. Lay concrete masonry in common bond.
    - b. Strike mortar joints in all block work.
    - c. Install steel column anchor bolts furnished by others in slabs and in foundation wall near front entrance. Fill cores of block to form solid pier.
    - d. Provide perimeter insulation: Styrofoam SM Brand insulation 1-1/2" thick. Apply to entire interior face of concrete block foundation walls, except top course, using #7 Styrofoam adhesive.
    - e. Provide corrugated galvanized masonry ties 48" o.c. at perimeter of slab. See drawings.

#### **SECTION 04300. MASONRY LINTELS**

- A. Provide reinforced precast concrete lintels over openings in walls as shown on plans.
- B. Provide reinforced preshaped bond beam lintels as shown on the Drawings. Bond beams to be filled with concrete with maximum aggregate of 3/8" diameter.

#### **SECTION 04500. MASONRY RESTORATION AND CLEANING**

- A. This section encompasses the repair and cleaning of new masonry work installed in the work of these projects.
- B. Remove, replace defective materials, correct defective workmanship.



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- C. Progress work in as clean manner as possible, remove excess materials, mortar droppings daily. Remove mortar droppings on connecting or adjoining work before its final set.

## **DIVISION 5 METALS**

### **SECTION 05010. WORK INCLUDED**

- A. Furnish labor and materials to perform metal work shown on the Drawings and specified in this Division of these Specifications.
- B. Detailed shop drawings for items of metal work specified in this Division shall be submitted to the Architect for review in accordance with section 01301. Shop Drawings and Samples of DIVISION 1 GENERAL REQUIREMENTS of these Specifications. Any material fabricated before final review of the shop drawings will be done at the risk of the Contractor.

### **SECTION 05100. STRUCTURAL STEEL**

- A. This section encompasses the items for the structural elements of steel and other metals.
  - 1. The following abbreviations are used:  
 A.I.S.C. - American Institute of Steel Construction  
 A.S.T.M. - American Society of Testing and Materials
  - 2. The work described in this section, except as noted on the Drawings and as otherwise specified herein, shall be governed by the latest edition of the A.I.S.C. "Code of Standard Practice and Specifications for the Design, Fabrication and Erection of Structural Steel for Building".
  - 3. All structural steel shall be furnished, fabricated, handled and erected in accordance with the A.I.S.C. "Specifications for Architecturally Exposed Structural Steel", and as hereinafter specified.
  - 4. Furnish anchor bolts and setting plans in ample time to prevent delay in other work. Anchor bolts shall be set as specified in the Concrete Section.
  - 5. Any adjustments necessary in the steel frame because of discrepancies in elevation and alignment or work done by others shall be the responsibility of this Contractor.
  - 6. The Contractor alone shall be responsible for the correct fitting of all structural members and for the elevation and alignment of the finished structure.
  - 7. Substitutions of sections or modifications of details shall be made only when approved by the Architect, and at no additional cost to the Owner.
  - 8. Provide flitch plates, angles, clips and misc. steel beams and columns as specified on the Drawings.
  - 9. Install canopy deck and canopy roof deck drain sump receiver plates as provided by the Plumber. Verify locations shown on the plans.
  - 10. Provide and install the elevator pit ladder as indicated on the drawings (Sheet A-27).
  - 11. Laundry room welded grate(s) as indicated on the drawings.
  - 12. Provide and install steel pan stairs and framing as shown on the drawings.

**B. Materials**

1. Structural Steel
  - a. ASTM A 36 unless otherwise noted on the Drawings.
2. Rivet Steel
  - a. Structural Rivet Steel: ASTM A 141.
3. Bolts
  - a. High strength steel bolts for structural joints: ASTM A 325.
4. Shop paint: "Tnemec" 99G Green metal primer, or an approved equal.
5. 1-1/2" 20 GA intermediate metal deck on carport canopy: 33,000 psi.

**SECTION 05101. FABRICATION**

**A. General**

1. Members to be milled shall be completely assembled and riveted or welded before milling.

**B. Connections**

1. Use standard column to beam connections as shown on the steel framing plan or as per "The Manual of Steel Construction" by the AISC.
2. Connections and details are subject to Architect's review.
3. Connections for beams with uniform loads shall be selected by the fabricator to support half the total uniform load capacity tabulated in the A.I.S.C. tables for allowable loads on beams for the given shape, span and steel specifications of the beam in question unless detailed by the Architect. The effect of concentrated loads shall also be considered and analysis of loading and end reactions made if necessary.
4. Support all base plates when erecting columns and insure proper smooth pad directly under plates.

**C. Painting**

1. All steel shall be thoroughly cleaned, all rust and mill scale removed, and shall receive one shop coat of paint, except contact surfaces using high strength friction type bolts.

**SECTION 05102. WELDING**

**A. Materials**

1. Welding Electrodes: ASTM A233 E 70XX

**B. Welding**

1. All welders shall be certified by an approved testing laboratory, to make groove and fillet welds in all positions.

**SECTION 05500. MISCELLANEOUS METAL**

**A. This section encompasses metal items manufactured to standard section and to details as shown on the Drawings.**

1. Handrails (interior and exterior as shown on the drawings): 1-1/4" inside diameter steel pipe unless otherwise noted. Balusters as detailed on the drawings.
2. 6" diameter steel pipe bumpers (ballards), filled with concrete with smooth dome type top.

3. Elevator Sill Angles: 4" x 4" x 3/8" thick at the door width.
4. Elevator pit ladder as detailed on the drawings.
5. Joist Anchor Straps: 3/16" x 1-1/4" x 1'-6" long iron strap (Cleveland Building Specialties T-18B) set 5" through strap, 1/2" from strap end. Straps to have 3/16" diameter holes at 4" (min.) o.c. Provide all straps to mason prior to commencement of exterior wall masonry work.
6. All shear wall bent plates and straps as shown on the drawings.
7. Provide form deck for stair landings and framing as shown on the drawings.
8. Provide steel pan stairs as shown on the drawings.
9. Provide and install decorative metals screens and rail systems on exterior of building adjacent to windows as shown on drawings.

#### B. Materials

1. Metals: Free from defects impairing strength, durability, appearance, best commercial quality for purposes specified, made with structural properties, to withstand safely, strains, stresses, to which they will be normally subjected.
2. Protect metals from damage at shops, in transit to job, until erected in place, completed, inspected, accepted.
3. Gages herein specified: Refer to U.S. Standard for sheet steel, plate iron, steel. Gage thickness specified are minimum.
4. Steel
  - a. Structural Steel: ASTM A 36
  - b. Architectural, miscellaneous steel, unless otherwise particularly specified: Mild Steel.
  - c. Cold Finish Steel: Mild Steel rolled or drawn, free from scale, accurate to size or gage.
  - d. Bolts, Nuts: ASTM A 325.
5. Aluminum Products: Aluminum alloys, of uniform quality, free from injurious defects, and as hereinafter specified.

#### C. Verifying Conditions. Verify measurements in field, as required, for work fabricated to fit job conditions.

#### D. Fabrication, Installation

1. Fabrication: Form work true to detail, with clean, straight sharply defined profiles.  
 Metals: Have smooth finished surfaces excepting where otherwise specified. Make joints of such character assembly to be strong, rigid as adjoining sections.  
 Welded Joints: Continuously welded or spot-welded as specified; dress face of welds flush, smooth.  
 Exposed Joints: Close fitting; make jointing where least conspicuous.  
 Jointing of Plain Surface, Moldings: Prohibited.
2. Cutting, Drilling: Do necessary cutting, drilling, fitting required for installation of miscellaneous metal work. Execute drilling, cutting, fitting carefully; when required, fit work at job before finishing.
3. Bolting, Screwing: Unless otherwise indicated, bolt, screw heads; flat, countersunk in exposed faces of work. Except as otherwise required, weld shop assembled connections; bolts or machine screws may be used for field connections unless otherwise shown or specified.  
 Exposed Fastenings: Same materials, color, finish as metal to which they apply, unless otherwise required.

4. Anchorage. Work to be built in masonry: Of form required for anchorage, or be provided with suitable anchors, expansion shield, etc., as required, for proper anchorage.
5. Supports: Install all supporting members, fastenings, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly, properly to structural steel, masonry, other construction.

E. Shop Painting.

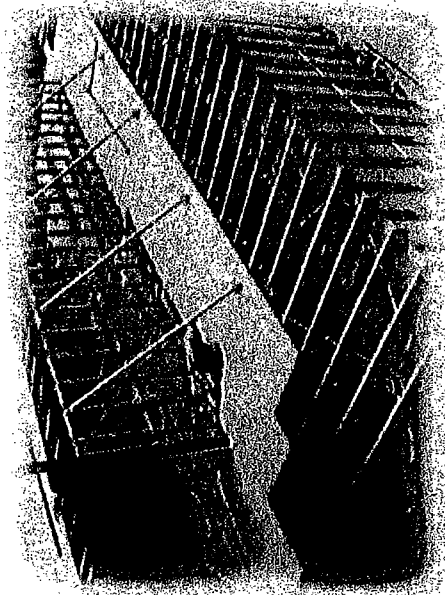
1. Paint work other than aluminum or factory finished metals with shop coat of metal protective paint before delivery or exposure to weather.  
Paint: Tnemec 99G Green Metal Primer, or Rust-Oleum 678 Quick-Drying Red Primer.  
Application: Clean thoroughly surfaces to be painted of scale, dirt, rust, oil, and/or grease. Work paint into joints, corners.

**SECTION 05205. LINTELS**

- A. Furnish lintels for openings as shown on Drawings.  
Installation/anchoring/setting of lintels set in masonry to be set by mason.

*"This is the most cost effective system for non-combustible, low to mid rise structures."*

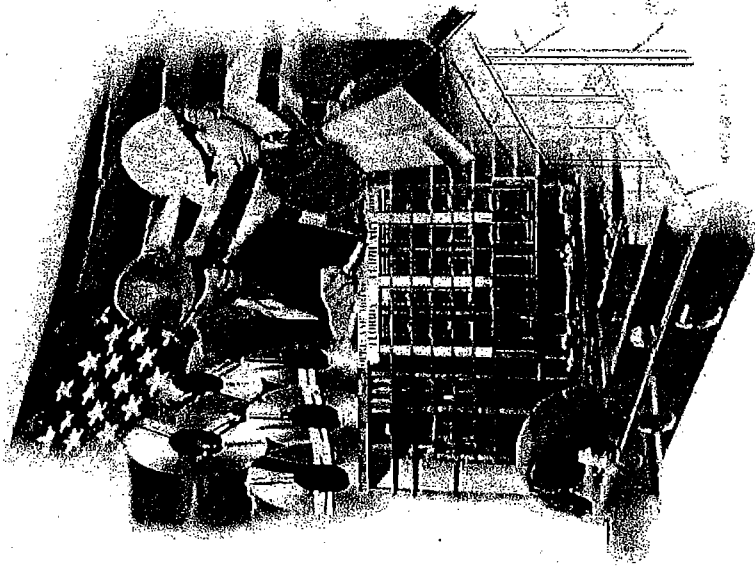
Mike Whitticar  
Enertech Systems  
Cleveland, OH



## ABOUT DIETRICH

Dietrich Metal Framing is the largest and only national manufacturer of light gage metal framing products. They offer a complete line of metal framing products including drywall, structural, fire-rated assemblies and the TradeReady® framing line. The TradeReady® line includes the floor, the one-piece header and the Spazzer® bridging and deflection bar. Dietrich also offers prefabricated factory built steel trusses through its joint venture company AEGIS® Metal Framing.

America's Largest  
Light Gage Steel  
Framing Manufacturer



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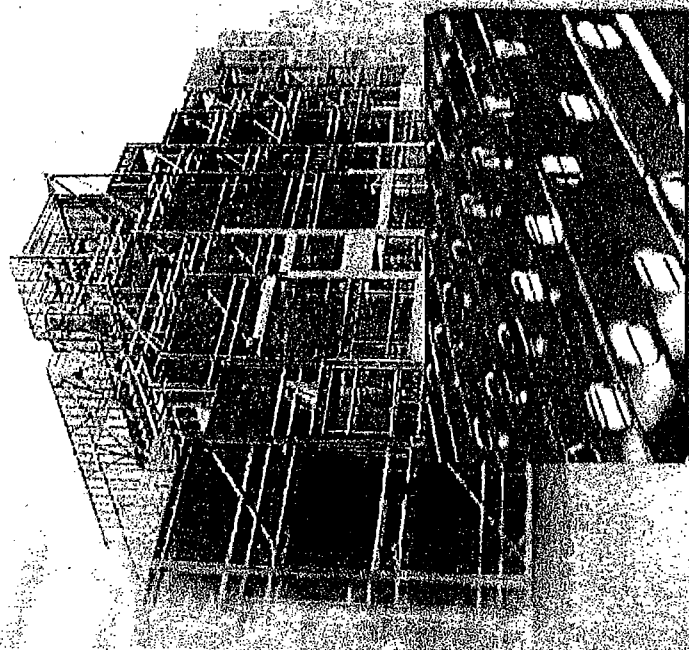


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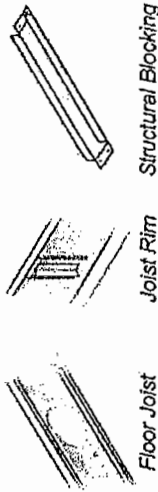
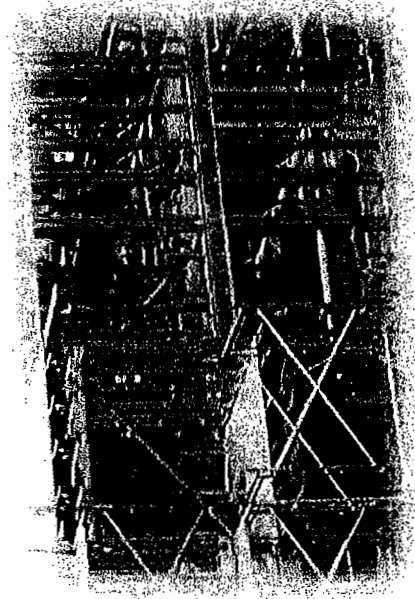
Redefining the way low-rise, mid-rise and multi-family structures are built.

## TradeReady® STEEL JOIST SYSTEM

Lighter structures, shorter construction cycles, reduced in-place costs and increased square footage density are just a few of the reasons you will want to consider the TradeReady® Steel Joist System on your next project. By utilizing a systems approach to building design, Dietrich provides the design professional with cost effective building solutions by incorporating the latest technological innovations. Let Dietrich Metal Framing, a Worthington Industries Company help you determine if the TradeReady® Steel Joist System is right for your next project.

## AN INNOVATIVE ALTERNATIVE

This innovative light gage floor joist framing system is a light-weight cost effective alternative to open web truss, bar joist, engineered lumber, cast in place or hollow core floor assemblies. The TradeReady® Steel Joist System is ideal for low and mid-rise commercial and multi-family construction projects including hotels, motels, apartment complexes, condominiums, assisted living facilities and low-rise office buildings. Used in conjunction with lightweight concrete or other floor sheathing products, the floor system can substantially reduce the overall building weight and design considerations.



## THE TradeReady® SYSTEM

The TradeReady® Steel Joist System has three basic components: Steel Floor Joist, Pre Punched Joist Rim and Pre-Cut Structural Blocking. Unlike traditional light gage floor framing, the TradeReady® Steel Joist System provides large extruded openings in the joist to accommodate electrical, mechanical, plumbing and technology lines.



The uniquely designed Joist Rim drastically reduces framing layout by providing pre-punched tabs at either 12, 16, 19.2 or 24 inch on center. The pre-cut structural blocking easily installs to the underside of the joists to prevent rotation. The TradeReady® System is available in a variety of sizes and gages ranging from 7 1/4" - 14" deep web members and 18 - 12 gages. The joist can single span in excess of 33'. Hole sizes range from 4 1/4" x 7", 6 1/2" x 9", 8" round or 10" round based on web member size.

## TradeReady® SYSTEM BENEFITS

**Lightweight-** Steel floor joists are lighter than most floor framing systems and may substantially reduce the overall building weight.

**Increased Square Footage Density-** A cost effective method to add additional stories and maximize building density.

**Spans-** Clear spans in excess of 33 feet.

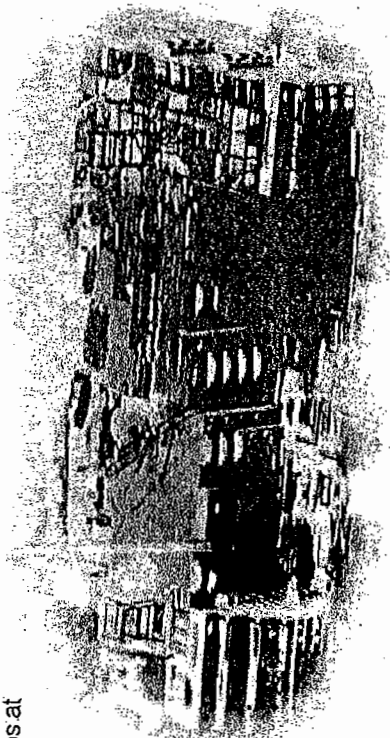
**Mechanical Access-** Large extruded holes provide substantial mechanical access and greatly reduce floor cavity thickness.

**Single Trade Installation-** Eliminate wet trades when used in conjunction with alternative floor sheathing products like Viroc.

**In-place Cost-** Steels floors are more economical and represent substantial in place savings.

**Readily Available-** Available within 1-2 weeks from order placement compared to competing systems that may require months.

**Green Building Product-** Steel Floors are made from recycled steel.

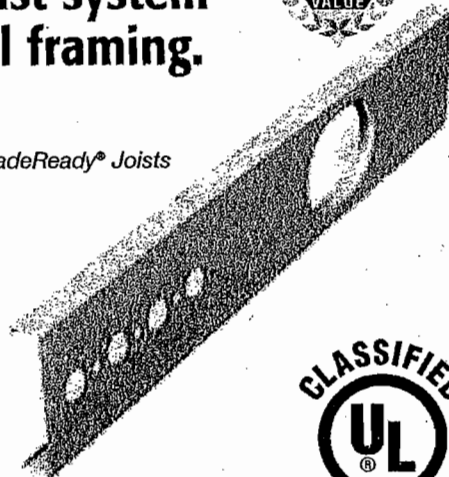


## Next-generation, high-performance TradeReady® Steel Joists are the premier floor joist system for both commercial and residential framing.



- Clear spans up to 33'.
- Large extruded openings to accommodate electrical, HVAC, plumbing and technology lines.
- Hole sizes range from 4-1/4" oval to 10" round based on member depth.
- Superior strength permits wider O.C. spacing.
- Precut to your exact specifications—no waste.
- Available in 7-1/4", 8", 9-1/4", 10", 11-1/4", 12" and 14" deep members.
- Flange sizes include 1-3/4" and 2".
- Eliminates soffit framing.
- UL\*\* Classified assembly L564.

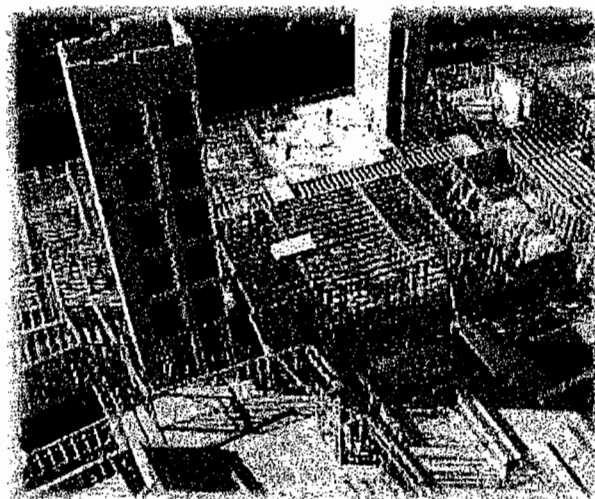
TradeReady® Joists



Dietrich™ TradeReady® steel joists are one of the primary components that make up the TradeReady® floor system. These joists feature large extruded holes that accommodate HVAC, mechanical, plumbing and sprinkler runs. The joist also features a series of smaller holes for electrical and technology lines.

Dietrich™ TradeReady® steel joists are precision manufactured from corrosion-resistant galvanized steel. Steel joists offer consistent quality, predictable performance and high strength to weight ratio, and they are dimensionally stable. They won't expand, contract or shrink; they won't warp, crack or twist. Steel joists integrate easily with other building materials such as structural steel, concrete, ICF and wood construction.

Joists can be ordered in standard lengths or to your exact specifications to minimize waste. Consult the Dietrich™ Technical Design Guide or the TradeReady® Steel Joist Design Guide for physical and structural properties, span charts and loading data.



### TradeReady® Steel Joist (TD Series™)

| DMF Product Code* | Thickness Gauge (mils) | Depth  |      | Flange |      | Return |      |
|-------------------|------------------------|--------|------|--------|------|--------|------|
|                   |                        | Inches | (mm) | Inches | (mm) | Inches | (mm) |
| TDJ (3,5)         | 18(43)                 | 7-1/4  | 184  | 1 3/4  | 44.5 | 5/8    | 15.9 |
|                   | 16(54)                 | 8      | 203  | 1 3/4  | 44.5 | 5/8    | 15.9 |
|                   | 14(68)                 | 9-1/4  | 235  | 1 3/4  | 44.5 | 5/8    | 15.9 |
|                   | 12(97)                 | 11-1/4 | 286  | 1 3/4  | 44.5 | 5/8    | 15.9 |
| TDW (3,5)         | 18(43)                 | 10     | 254  | 2      | 50.8 | 5/8    | 15.9 |
|                   | 16(54)                 | 12     | 305  | 2      | 50.8 | 5/8    | 15.9 |
|                   | 14(68)                 | 14     | 356  | 2      | 50.8 | 5/8    | 15.9 |
|                   | 12(97)                 |        |      |        |      |        |      |

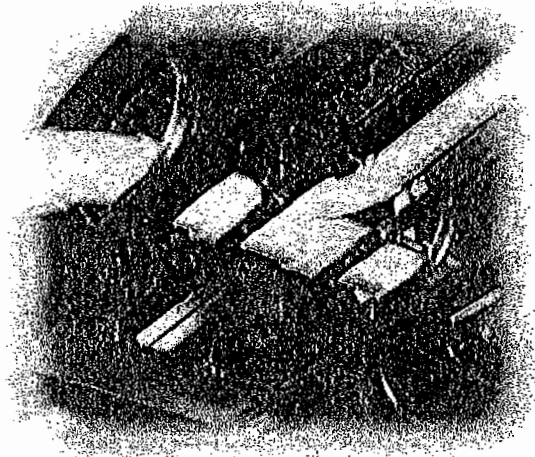
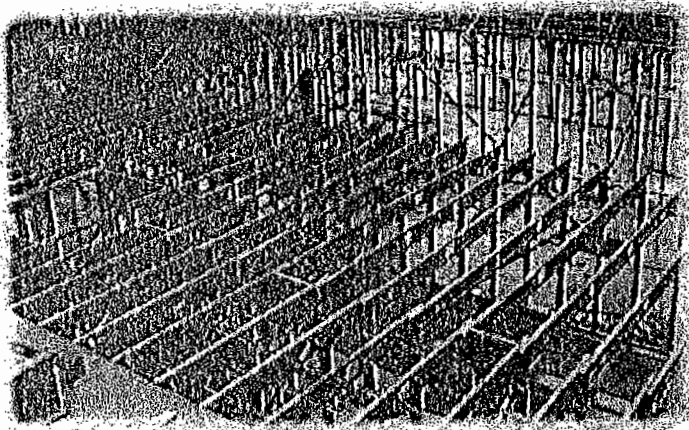
\*3 or 5 Indicates ksi.

18-gauge is standard as 33 ksi yield strength.

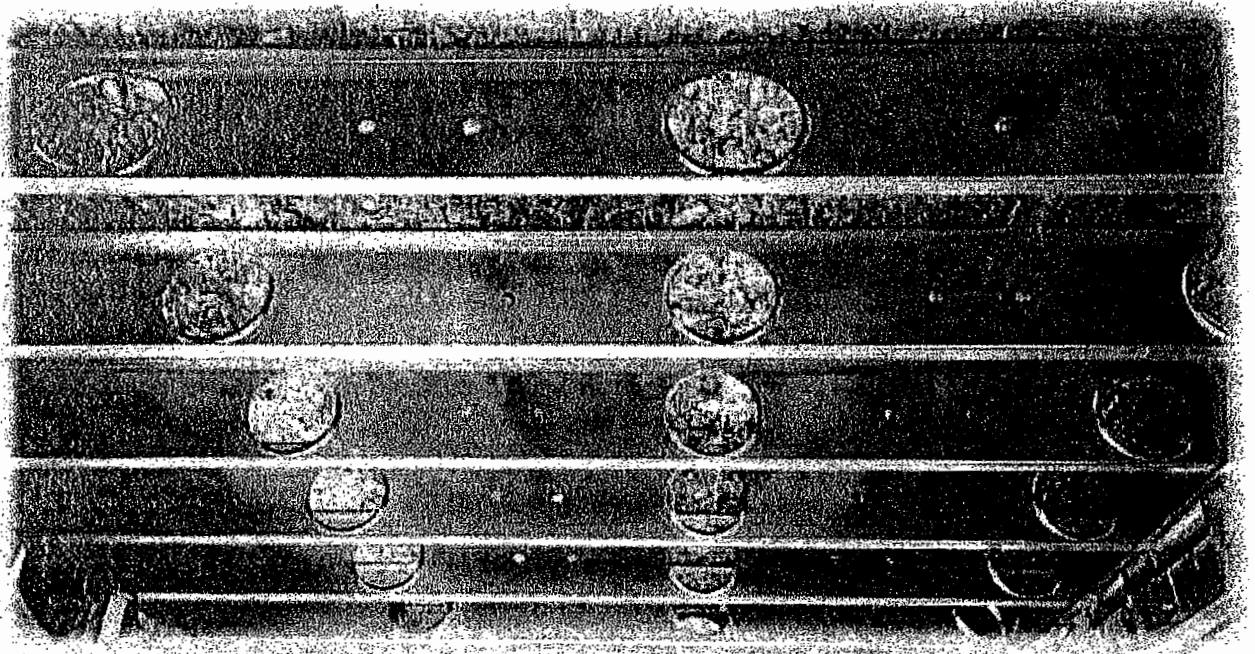
16, 14 and 12 gauge are standard as 50 ksi yield strength.

\*\*UL and UL Classified are trademarks of Underwriter's Laboratories, Inc.





TradeReady® Steel Joists (TDJ and TDW Series™)

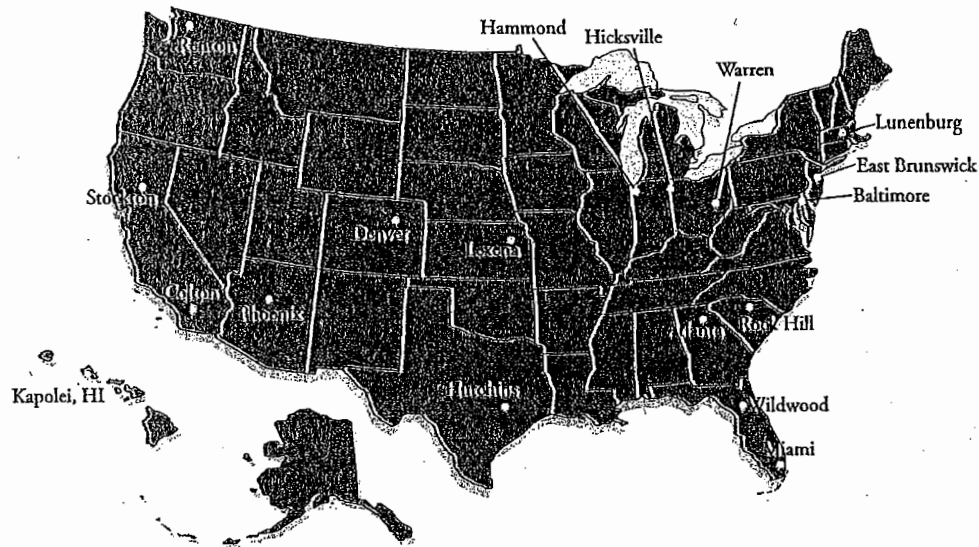


## TradeReady® Joist (TD Series™)

| Hole Size<br>Inches | Hole Size<br>(mm) | Hole Shape                                                                           | Web Width<br>Inches (mm)           |
|---------------------|-------------------|--------------------------------------------------------------------------------------|------------------------------------|
| 4-1/4" x 7"         | (108 x 178)       |  | 7-1/4" (184) TDJ<br>8" (203) TDJ   |
| 6-1/4" x 9"         | (159 x 229)       |  | 9-1/4" (235) TDJ<br>10" (254) TDW  |
| 8" Diam.            | (203)             |  | 11-1/4" (286) TDJ<br>12" (305) TDW |
| 10" Diam.           | (254)             |  | 14" (356) TDW                      |

For more information or to contact a sales representative, see page 3.

# STEEL JOIST DESIGN GUIDE



**Dietrich Metal Framing**  
 500 Grant Street / Suite 2226  
 Pittsburgh, PA 15219  
 Telephone: (412) 281-2805  
 www.steelfloorjoist.com  
 e-mail: info@dietrichindustries.com

|                   |                                                                                                                          |                |                                                                                                                            |                       |                                                                   |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------|
| <b>ARIZONA</b>    | <b>Phoenix</b><br>Phone: 602-447-0204<br>Fax: 602-447-3017                                                               | <b>GEORGIA</b> | <b>Atlanta</b><br>Phone: 404-696-7700<br>Fax: 404-696-7797                                                                 | <b>MARYLAND</b>       | <b>Baltimore</b><br>Phone: 410-477-8700<br>Fax: 410-477-3536      |
| <b>CALIFORNIA</b> | <b>Colton</b><br>Phone: 909-824-9717<br>Fax: 909-824-5760<br><b>Stockton</b><br>Phone: 209-547-9066<br>Fax: 209-547-9128 | <b>HAWAII</b>  | <b>Kapolei</b><br>Phone: 808-682-5747<br>Fax: 808-682-2928                                                                 | <b>MASSACHUSETTS</b>  | <b>Lunenburg</b><br>Phone: 978-342-9742<br>Fax: 978-342-9765      |
| <b>COLORADO</b>   | <b>Denver</b><br>Phone: 303-289-4092<br>Fax: 303-289-4157                                                                | <b>INDIANA</b> | <b>Hammond</b><br>Phone: 219-931-3741<br>Fax: 219-937-6804                                                                 | <b>NEW JERSEY</b>     | <b>East Brunswick</b><br>Phone: 732-432-0892<br>Fax: 732-432-0841 |
| <b>FLORIDA</b>    | <b>Miami</b><br>Phone: 305-652-5423<br>Fax: 305-652-5344<br><b>Wildwood</b><br>Phone: 352-748-7200<br>Fax: 352-748-7252  | <b>OHIO</b>    | <b>Hicksville</b><br>Phone: 419-542-7781<br>Fax: 419-542-7816<br><b>Warren</b><br>Phone: 330-372-5564<br>Fax: 330-372-4055 | <b>SOUTH CAROLINA</b> | <b>Rock Hill</b><br>Phone: 803-324-4140<br>Fax: 803-324-7090      |
|                   |                                                                                                                          | <b>KANSAS</b>  | <b>Lenexa</b><br>Phone: 913-599-2026<br>Fax: 913-599-2028                                                                  | <b>TEXAS</b>          | <b>Hutchins</b><br>Phone: 972-225-1100<br>Fax: 972-225-9032       |
|                   |                                                                                                                          |                |                                                                                                                            | <b>WASHINGTON</b>     | <b>Renton</b><br>Phone: 425-251-1497<br>Fax: 425-251-3161         |

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" THE STRENGTH TO SUPPORT YOU "



**DIETRICH**  
METAL FRAMING  
A Worthington Industries Company

## A Glossary of terms:

|                              |                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Blocking:</b>             | Solid block or piece of material placed between structural members to provide lateral bracing as in bridging and/or edge support for sheathing.                                                                                                                                                                                                              |
| <b>Bridging:</b>             | Cross bracing or blocking placed between joists to provide lateral support.                                                                                                                                                                                                                                                                                  |
| <b>C-Shape:</b>              | A basic cold-formed steel shape used for structural framing members (such as joists). The name comes from the member's "C" shaped cross-sectional configuration consisting of a web, flange and lip. It is also called a "C-section". Web depth measurements are taken to the outside of the flanges. Flange width measurements also use outside dimensions. |
| <b>Clip Angle:</b>           | An L-shaped short piece of metal (normally with a 90-degree bend) typically used for connections.                                                                                                                                                                                                                                                            |
| <b>Flange:</b>               | The part of a C-Shape or track that is perpendicular to the web.                                                                                                                                                                                                                                                                                             |
| <b>Flat Strap:</b>           | Sheet steel cut to a specified width without any bends. Typically used for bracing and transferring loads by tension.                                                                                                                                                                                                                                        |
| <b>Floor Joist:</b>          | A horizontal structural framing member that supports floor loads.                                                                                                                                                                                                                                                                                            |
| <b>Hard Side of Joist:</b>   | Plane at joist along the web side opposite the C opening. The outside of the C.                                                                                                                                                                                                                                                                              |
| <b>Header:</b>               | A horizontal built-up structural framing member used for floor openings to transfer loads to adjacent framing members.                                                                                                                                                                                                                                       |
| <b>Joist Orientation:</b>    | To assure that the holes line up across a given area of the foundation, the joist needs to be installed from the same beginning point.                                                                                                                                                                                                                       |
| <b>Lip:</b>                  | The part of a C-Shape that extends from the flange at the open end. The lip increases the strength characteristics of the member and acts as a stiffener to the flange.                                                                                                                                                                                      |
| <b>Loads, Live and Dead:</b> | Dead loads are the weight of the walls, partitions, framing, floors, ceilings, roofs, and all other permanent construction entering into and becoming a part of a building. Live loads are transient and sustained loads usually created by people and furnishing, respectively.                                                                             |
| <b>Multiple Span:</b>        | The span made by a continuous member having intermediate supports.                                                                                                                                                                                                                                                                                           |
| <b>Open side of Joist:</b>   | Plane of joist along the flange of the open side of the "C".                                                                                                                                                                                                                                                                                                 |
| <b>Span:</b>                 | The clear horizontal distance between bearing supports.                                                                                                                                                                                                                                                                                                      |
| <b>Punchout:</b>             | A hole or opening in the web of a steel framing member allowing for the installation of plumbing, electrical, and other utility installation. A punchout may be made during the manufacturing process or in the field with a hand punch, hole saw, or other suitable tool.                                                                                   |
| <b>Single Span:</b>          | The span made by one continuous structural member without any intermediate supports.                                                                                                                                                                                                                                                                         |
| <b>Span Direction:</b>       | The direction the joist lays across the foundation.                                                                                                                                                                                                                                                                                                          |
| <b>Structural Sheathing:</b> | The covering (e.g., plywood or oriented strand board) used directly over structural members (e.g., joists) to distribute loads, provide lateral stability to the framing members, and generally strengthen the assembly.                                                                                                                                     |
| <b>Web:</b>                  | The part of a C-Shape or track that connects the two flanges.                                                                                                                                                                                                                                                                                                |
| <b>Web Crippling:</b>        | The localized permanent (inelastic) deformation of the web member subjected to concentrated load or reaction at bearing supports.                                                                                                                                                                                                                            |
| <b>Web Stiffener:</b>        | Additional material that is attached to the web to strengthen the member against web crippling. Also called a bearing or transverse stiffener.                                                                                                                                                                                                               |

"THE STRENGTH TO SUPPORT YOU"

## 1.0 GENERAL NOTES

- 1.01 Contents of this Design Guide show the intended application of Dietrich Metal Framing TradeReady® Steel Joist framing components and accessories. Framing erector is to refer to the project contract documents for additional construction assembly requirements. The substitution of any other material deems this information null and void.
- 1.02 Details shown are for common and general applications. They are for design reference only. All conditions shall be field verified prior to erection.
- 1.03 The contents of this Design Guide are subject to the review and approval of the Owner's Structural Engineer and Architect prior to erection. Material selections and connection details shown may differ from those shown in the contract documents. The framing erector should not order material before receiving shop drawing approval from the project officials.
- 1.04 Adequacy of the primary structure for loads imposed by the cold formed framing system is not the responsibility of Dietrich Metal Framing.
- 1.05 For specific requirements and warranty information on systems or materials connected and appurtenant to the cold-formed steel framing including windows, caulking and flashings, refer to manufacturer's data. Dietrich Metal Framing assumes no responsibility for the proper construction or function of the total architectural assembly.
- 1.06 Conditions and or sections encircled may require special review by the project architect and/or structural engineer. Additional project detail information and verification of conditions may be required.
- 1.07 The design of the cold-formed framing is performed in accordance with the AISI "Specification for the Design of Cold Formed Steel Structural Members".
- 1.08 Framing analysis assumes that the sheathing is attached to each floor joist, solid block, and rim track. Framing analysis is limited to the uniform distribution of load to the joist and does not include review of the effects of local forces.
- 1.09 This Design Guide does not take precedence over the contract documents with regard to minimum yield strength, gage, web depth, flange width or stud spacing, unless approved by the Engineer of Record (E.O.R.).
- 1.10 Calculation and shop drawings included in this Design Guide do not take into consideration the overall stability of structure. It is the responsibility of the Structural Engineer of Record to design the shear strapping and/or determine the allowable resistance of the building diaphragm to maintain overall stability of the structure.
- 1.11 The information here in is an aid in the general construction of Dietrich Metal Framing's TradeReady Steel Joist System and to facilitate the work that the framer, architect or the engineer of record must perform. They do not in any way imply the assumption of professional responsibility of the architect or of the engineer of record by Dietrich Metal Framing.

## 2.0 INSTALLATION NOTES

- 2.01 All framing components shall be cut squarely for attachment to perpendicular members or as required on angular fit against abutting members. Members shall be held positively in place until properly fastened.
- 2.02 Temporary bracing shall be provided and remain in place until the structure is completely stabilized. Design of temporary bracing is not the responsibility of Dietrich Metal Framing.
- 2.03 All field cutting of members must be done by sawing, plasma cutting or shearing. Torch cutting of cold formed members is unacceptable.
- 2.04 It is the responsibility of the contractor to assemble the floor system in such a way that the knockouts align for mechanical runs and to ensure that knockouts do not occur within 6" of a bearing point due to field cutting.
- 2.05 No splices in studs, joists, or other load carrying members may be made without prior engineering review and specific details for any such splice(s).
- 2.06 If additional holes are required beyond the scope of the "Field Cut Holes Table" in the floor system, contact a licensed professional engineer for guidance before cutting.
- 2.07 Mechanical bridging, spaced at the intervals described herein, shall be installed prior to the attachment of sheathing materials.
- 2.08 Installation of sheathing, wallboard or any other collateral material shall be performed in accordance with the product manufacturer's specifications, the current ASTM standard and/or guidelines outlined in the contract documents.
- 2.09 For all tracks used in composite members such as beams and girders, the track must be installed as a single piece, no splicing permitted, unless otherwise noted.
- 2.10 When support clips are used to attach a component to the primary structure, the support clip is to be fastened to the primary structure first. Then, the component should be brought to bear on the structure, and then fastened to the support clip.
- 2.11 Support clips/hangers shall be installed per manufacturers instructions.

### 3.0 MATERIAL NOTES

- 3.01 Properties used in this Design Guide are those published by Dietrich Metal Framing. No other material may be utilized.
- 3.02 All members 16 gage and heavier shall be formed from steel corresponding to a type listed in the A.I.S.I. "Specification for the Design of Cold-Formed Steel Structural Members", with a minimum yield strength of 50 ksi unless specifically noted otherwise.
- 3.03 All 18 gage and lighter members shall be formed from steel corresponding to a type listed in the A.I.S.I. "Specification for the Design of Cold-Formed Steel Structural Members" with a minimum yield strength of 33 ksi unless specifically noted otherwise.
- 3.04 Structural properties and capacities of steel framing components shall be in accordance with the A.I.S.I. "Specification for the Design of Cold-Formed Steel Structural Members".
- 3.05 All structural framing products shall be formed from steel possessing a coating corresponding to the minimum requirements of ASTM C955.
- 3.06 When Dietrich TradeReady® steel joist or track are to be used for a beam, girder, or header application, joist and track members shall have unpunched webs unless otherwise approved. It is the responsibility of the contractor to specify unpunched members when ordering materials.
- 3.07 All support clips and clip angles are 50 ksi., unless noted otherwise.

## Job Site Safety

**Always follow OSHA guidelines and safety requirements when they are applicable.**

- DO NOT walk on unbraced joist.  
Injury may result.
- DO NOT load floor decking before sheathing and bracing is complete.  
Place loads only over load bearing members.
- Wear work gloves to protect hands from cuts and injuries when working with steel.
- Safety goggles are recommended when cutting steel or when fastening members.
- Cutting and welding galvanized steel can produce harmful fumes that can be hazardous to health and cause irritation to respiratory system. Make sure all cutting and welding is done in a well-ventilated area.
- Use caution when working with steel when wet. Steel members may be slippery and cause injuries if not properly handled.

---

## Storage and Handling

**Proper storage and handling will ensure the structural integrity of steel framing members and components**

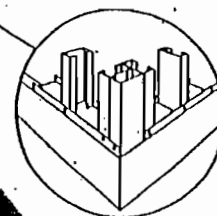
1. TradeReady® Steel joist bundles should be stored level.
2. DO NOT open bundles until time of installation. Use care when handling bundles and individual components to prevent injury to handlers or damage by forklift or crane.
3. Twisting of steel joists, or applying loads to the joist when flat can damage the joist.  
Damaged steel joists should not be used.
4. Never handle steel joist flat. Beginning with the unloading process, and throughout all phases of construction, care must be taken to avoid lateral and torsional bending of joists, which can cause damage to the steel joists.



05400/DAL  
DALE/INCOR

# LIGHT GAUGE STEEL FRAMING

DALE/INCOR



STUD CORNER  
DETAIL



**The Largest Source  
for Prime Steel Products**



**Table of Contents:**

- 2-3) Table of Contents, Company and Product Notes
- 4-7) Physical Property Tables
  - 8) Bracing
  - 9) Floor Assemblies
- 10) CRC & DWC Properties and Tables
- 11) Engineered Metal Trusses
- 12) Specifications and Plant Locations

**The Company:**

Dale Industries was founded in May 1952. With the purchase of Allied Structural Industries' assets in 1987, the acquisition of Incor, Inc. in 1988 and the purchase of Amico's Light Gage Metal Framing Plant in 1996, Dale has evolved into a significant manufacturer of building supplies and accessories. These acquisitions bring with them years of manufacturing and technical experience. Incor is particularly proud of its former affiliation with the Inryco/Milcor subsidiary of the Inland Steel Company, which divested itself from the light gage steel framing market in 1986. Dale/Incor, as we are known today, is committed to continue the high quality products of the former Inryco Plant. During the past 40 years of growth, Dale/Incor has positioned itself as a major supplier of building products in the U.S. as well as in many foreign countries.

Having manufacturing facilities in Dearborn, Michigan; Baltimore, Maryland; Birmingham, Alabama; and Ft. Lauderdale, Florida, Dale/Incor is now poised to provide exceptional service to the building products market. All four facilities are capable of servicing distributorships within their geographic area or providing backup service to any of the other facilities. Dale/Incor will continue to add new locations in the future in order to expand its delivery and geographical service capability.

**Steel Values:**

The thicknesses used in this catalog are the standard minimum thicknesses specified by A.I.S.I. with respect to A.S.T.M. standards. Other manufacturer's catalogs may show higher values for similar products. This is usually the result of using heavier steel thicknesses for calculation purposes. This catalog is based upon minimum design thicknesses for a conservative approach. Calculations used in this brochure have been based upon the 1986 A.I.S.I. "Specification for the Design of Cold Formed Steel Structural Members" with the 1989 addendum and UBC 27-9. Gages and thicknesses used are as follows:

| Gage  | Design Thicknesses |
|-------|--------------------|
| 10GA. | .1242 in.          |
| 12GA. | .1017 in.          |
| 14GA. | .0713 in.          |
| 16GA. | .0566 in.          |
| 18GA. | .0451 in.          |
| 20GA. | .0346 in.          |

Values for 12, 14 and 16 Gage Studs, Joists and Purlins were calculated on the basis of 50,000 P.S.I. Steel for Axial and Joist Tables. Values for 33,000 P.S.I. available upon request.

**Other Products:**

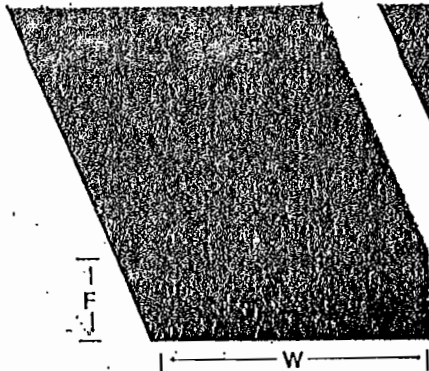
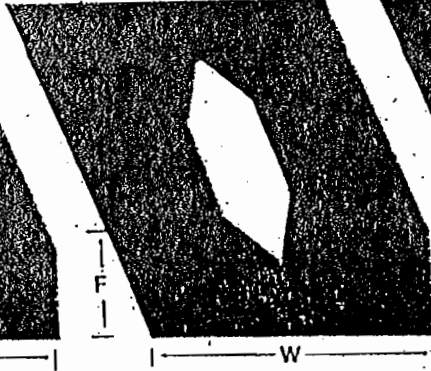
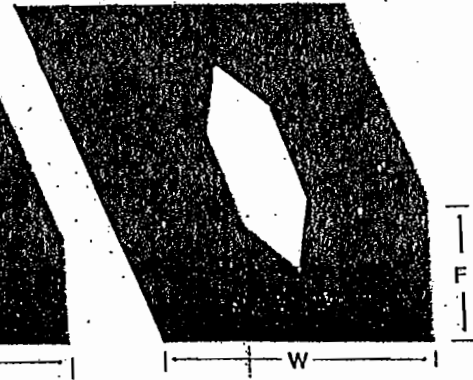
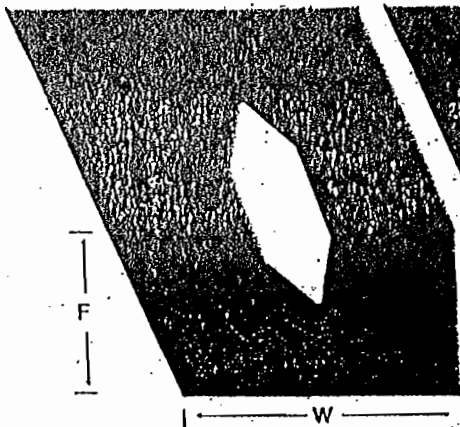
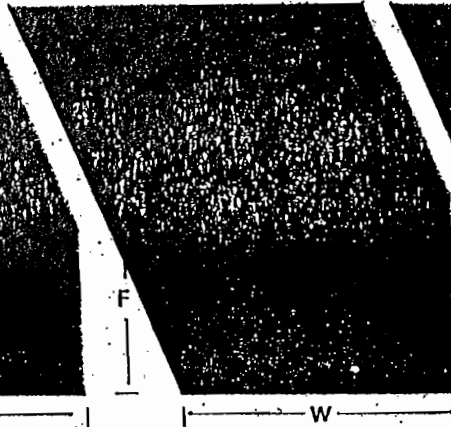
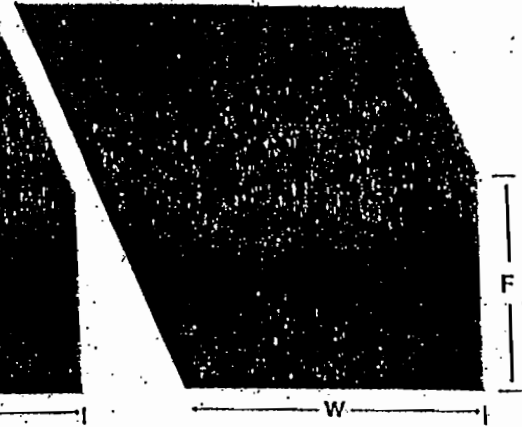
In addition to steel framing DALE/INCOR manufactures a complete line of Drywall Steel Studs, Drywall Accessories and Lath. As these products are non-structural, they are grouped together in a separate catalog which is positioned in Section 09250/DAL of Sweets.

DALE/INCOR also manufactures a complete line of metal products for the residential market. Principal product lines are Roof Drainage Items, Louvers, Roof Vents, Valley Coil and Drip Edge. These products are primarily sold to lumber yards and are marketed in the Midwest. Most items are manufactured in aluminum as well as steel.

**New Products:**

Panelized Wall and Roof Systems

DALE / INCOR assumes no liability for failure of our products resulting from the misapplication of information shown in this publication or for failure resulting from improper installation. The data and tables are prepared for the sole purpose of aiding the Architect or Engineer of record.

TD Deep Leg  
Track  
1 1/4" LegCN Stud  
1 3/8" FlangeCEE Stud  
1 5/8" FlangeJW Joist  
2" FlangeJWE Joist  
2 1/2" FlangeSCJ Super C Joist  
3 1/2" Flange

F = Flange Size  
W = Web Size (Dimensions on Pages 4-7)

### FOOT NOTES: Physical Property Tables

1. All section properties are based on the 1986 edition of the American Iron & Steel Institute (AISI) Cold Formed Steel Specification with 1989 addendum and UBC 37-9.
2. Gross and torsional properties are based upon the full unreduced cross section.
3. The effective moment of inertia and section modulus are based on procedure 1 for deflection determination at the allowable moment. See section B2 of AISI Code and Example No. 1.
4. Allowable bending moment,  $M_r$ , was calculated according to AISI Section C3.1 using procedure 1.
5. Weak axis (Y-Y) effective properties are calculated assuming the web is in compression.
6. All Products - punched 18" from one end and 30" on center thereafter, unless specified differently.
7. Standard track (TD) is 10' - 0". Special lengths to 40' - 0" on request.
8. Design return lips are as follows: CN - 3/8", CEE - 1/2", JW & JWE - 5/8".

- $I_x$  - Moment of inertia for deflection about the x-axis.
- $S_x$  - Section modulus for load about the x-axis.
- $R_x$  - Radius of gyration about the x-axis.
- $I_y$  - Moment of inertia about the y-axis.
- $S_y$  - Section modulus about the y-axis.
- $R_y$  - Radius of gyration about the y-axis.
- $C_w$  - Torsional Wrapping Constant.
- $J$  - St. Venant Torsion Constant.
- $R_o$  - Polar Radius of gyration taken about the shear center.
- $X_o$  - Location of shear center from the centroid along the x-axis.
- Beta - Torsional-flexural constant.
- $M_x$  - Allowable resisting moment. Listed values incorporate the effects of cold forming as allowed per section A5.2.2. of the 1989 edition of AISI "Specification for Design of Cold Formed Steel Structural Members". Values shown are in inch-kips.

## Physical Properties

| WEB<br>(in) | SECTION | GA    | WT<br>(lb/ft) | GROSS SECTION PROPERTIES |                                      |                                      |                        |                                      |                                      |                        |                                      | EFFECTIVE PROPERTIES                 |                          |                        | TORSIONAL PROPERTIES                      |                                      |                        |           |  |
|-------------|---------|-------|---------------|--------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|--------------------------|------------------------|-------------------------------------------|--------------------------------------|------------------------|-----------|--|
|             |         |       |               | A<br>(in <sup>2</sup> )  | I <sub>x</sub><br>(in <sup>4</sup> ) | S <sub>x</sub><br>(in <sup>3</sup> ) | R <sub>x</sub><br>(in) | I <sub>y</sub><br>(in <sup>4</sup> ) | S <sub>y</sub><br>(in <sup>3</sup> ) | R <sub>y</sub><br>(in) | I <sub>x</sub><br>(in <sup>4</sup> ) | S <sub>x</sub><br>(in <sup>3</sup> ) | M <sub>x</sub><br>(in-k) | X <sub>0</sub><br>(in) | J <sub>x</sub> 1000<br>(in <sup>4</sup> ) | C <sub>w</sub><br>(in <sup>6</sup> ) | R <sub>0</sub><br>(in) | B<br>BETA |  |
| 2 1/2       | CH      | 20    | 0.686         | 0.199                    | 0.206                                | 0.164                                | 1.017                  | 0.053                                | 0.060                                | 0.517                  | 0.206                                | 0.164                                | 3.256                    | -1.164                 | 0.079                                     | 0.075                                | 1.630                  | 0.490     |  |
|             |         | 18    | 0.882         | 0.255                    | 0.261                                | 0.209                                | 1.011                  | 0.067                                | 0.075                                | 0.511                  | 0.261                                | 0.209                                | 4.222                    | -1.157                 | 0.173                                     | 0.094                                | 1.619                  | 0.489     |  |
|             |         | 16    | 1.091         | 0.316                    | 0.318                                | 0.255                                | 1.004                  | 0.080                                | 0.090                                | 0.504                  | 0.318                                | 0.255                                | 7.636                    | -1.150                 | 0.337                                     | 0.113                                | 1.608                  | 0.488     |  |
|             |         | 14    | 1.347         | 0.390                    | 0.386                                | 0.309                                | 0.995                  | 0.096                                | 0.107                                | 0.495                  | 0.386                                | 0.309                                | 10.674                   | -1.141                 | 0.661                                     | 0.134                                | 1.593                  | 0.487     |  |
|             | CEE     | 20    | 0.775         | 0.225                    | 0.238                                | 0.190                                | 1.028                  | 0.088                                | 0.088                                | 0.626                  | 0.238                                | 0.190                                | 3.763                    | -1.494                 | 0.090                                     | 0.145                                | 1.918                  | 0.394     |  |
|             |         | 18    | 1.000         | 0.289                    | 0.302                                | 0.242                                | 1.022                  | 0.111                                | 0.112                                | 0.620                  | 0.302                                | 0.242                                | 5.113                    | -1.488                 | 0.196                                     | 0.182                                | 1.909                  | 0.392     |  |
|             |         | 16    | 1.237         | 0.358                    | 0.370                                | 0.296                                | 1.016                  | 0.135                                | 0.135                                | 0.613                  | 0.370                                | 0.296                                | 8.874                    | -1.482                 | 0.303                                     | 0.219                                | 1.898                  | 0.391     |  |
|             |         | 14    | 1.532         | 0.443                    | 0.450                                | 0.360                                | 1.008                  | 0.162                                | 0.162                                | 0.605                  | 0.450                                | 0.360                                | 11.712                   | -1.474                 | 0.752                                     | 0.262                                | 1.885                  | 0.389     |  |
|             | JW      | 20    | 0.895         | 0.259                    | 0.281                                | 0.225                                | 1.041                  | 0.156                                | 0.134                                | 0.775                  | 0.274                                | 0.216                                | 4.274                    | -1.952                 | 0.103                                     | 0.300                                | 2.344                  | 0.307     |  |
|             |         | 18    | 1.155         | 0.334                    | 0.359                                | 0.287                                | 1.036                  | 0.198                                | 0.170                                | 0.769                  | 0.359                                | 0.287                                | 5.683                    | -1.947                 | 0.227                                     | 0.379                                | 2.336                  | 0.305     |  |
|             |         | 16    | 1.433         | 0.415                    | 0.440                                | 0.352                                | 1.030                  | 0.241                                | 0.207                                | 0.763                  | 0.440                                | 0.352                                | 10.556                   | -1.941                 | 0.443                                     | 0.459                                | 2.326                  | 0.303     |  |
|             |         | 14    | 1.778         | 0.515                    | 0.537                                | 0.430                                | 1.022                  | 0.293                                | 0.251                                | 0.755                  | 0.537                                | 0.430                                | 12.900                   | -1.935                 | 0.872                                     | 0.554                                | 2.315                  | 0.301     |  |
|             | JWE     | 18    | 1.310         | 0.380                    | 0.427                                | 0.341                                | 1.060                  | 0.336                                | 0.235                                | 0.942                  | 0.424                                | 0.337                                | 6.677                    | -2.438                 | 0.257                                     | 0.634                                | 2.820                  | 0.253     |  |
|             |         | 16    | 1.628         | 0.471                    | 0.524                                | 0.419                                | 1.055                  | 0.412                                | 0.287                                | 0.935                  | 0.499                                | 0.384                                | 11.506                   | -2.433                 | 0.503                                     | 0.771                                | 2.811                  | 0.251     |  |
|             |         | 14    | 2.024         | 0.586                    | 0.643                                | 0.514                                | 1.047                  | 0.503                                | 0.350                                | 0.926                  | 0.638                                | 0.506                                | 15.171                   | -2.426                 | 0.993                                     | 0.934                                | 2.800                  | 0.249     |  |
|             |         | 12    | 2.425         | 0.719                    | 0.793                                | 0.614                                | 1.040                  | 0.599                                | 0.092                                | 0.619                  | 0.813                                | 0.638                                | 18.802                   | -1.345                 | 0.103                                     | 0.274                                | 2.042                  | 0.566     |  |
| 3 1/2       | CEE     | 20    | 0.895         | 0.259                    | 0.513                                | 0.293                                | 1.406                  | 0.099                                | 0.092                                | 0.619                  | 0.513                                | 0.293                                | 5.802                    | -1.345                 | 0.103                                     | 0.274                                | 2.042                  | 0.566     |  |
|             |         | 18    | 1.155         | 0.334                    | 0.655                                | 0.374                                | 1.400                  | 0.126                                | 0.116                                | 0.613                  | 0.655                                | 0.374                                | 7.913                    | -1.338                 | 0.227                                     | 0.346                                | 2.031                  | 0.566     |  |
|             |         | 16    | 1.433         | 0.415                    | 0.804                                | 0.460                                | 1.393                  | 0.152                                | 0.141                                | 0.606                  | 0.804                                | 0.460                                | 13.790                   | -1.331                 | 0.443                                     | 0.418                                | 2.019                  | 0.566     |  |
|             |         | 14    | 1.778         | 0.515                    | 0.985                                | 0.563                                | 1.383                  | 0.184                                | 0.170                                | 0.597                  | 0.985                                | 0.563                                | 18.296                   | -1.321                 | 0.872                                     | 0.503                                | 2.004                  | 0.565     |  |
|             | JW      | 20    | 1.015         | 0.294                    | 0.603                                | 0.345                                | 1.432                  | 0.176                                | 0.140                                | 0.774                  | 0.590                                | 0.332                                | 6.575                    | -1.782                 | 0.117                                     | 0.536                                | 2.414                  | 0.455     |  |
|             |         | 18    | 1.310         | 0.380                    | 0.772                                | 0.441                                | 1.426                  | 0.224                                | 0.178                                | 0.769                  | 0.772                                | 0.441                                | 8.736                    | -1.776                 | 0.257                                     | 0.680                                | 2.404                  | 0.454     |  |
|             |         | 16    | 1.628         | 0.471                    | 0.950                                | 0.543                                | 1.420                  | 0.274                                | 0.217                                | 0.762                  | 0.950                                | 0.543                                | 16.290                   | -1.769                 | 0.503                                     | 0.827                                | 2.393                  | 0.453     |  |
|             |         | 14    | 2.024         | 0.586                    | 1.167                                | 0.667                                | 1.411                  | 0.333                                | 0.263                                | 0.751                  | 1.167                                | 0.667                                | 20.005                   | -1.761                 | 0.993                                     | 1.001                                | 2.379                  | 0.452     |  |
|             | CN      | 20    | 0.821         | 0.238                    | 0.484                                | 0.267                                | 1.427                  | 0.060                                | 0.062                                | 0.503                  | 0.484                                | 0.267                                | 5.286                    | -1.022                 | 0.095                                     | 0.163                                | 1.826                  | 0.687     |  |
|             |         | 18    | 1.058         | 0.306                    | 0.617                                | 0.340                                | 1.420                  | 0.076                                | 0.078                                | 0.497                  | 0.617                                | 0.340                                | 6.885                    | -1.014                 | 0.208                                     | 0.204                                | 1.814                  | 0.687     |  |
|             |         | 16    | 1.310         | 0.379                    | 0.756                                | 0.417                                | 1.411                  | 0.091                                | 0.094                                | 0.490                  | 0.756                                | 0.417                                | 12.511                   | -1.006                 | 0.405                                     | 0.246                                | 1.801                  | 0.688     |  |
|             |         | 14    | 1.624         | 0.470                    | 0.923                                | 0.509                                | 1.401                  | 0.109                                | 0.112                                | 0.481                  | 0.923                                | 0.509                                | 17.601                   | -0.996                 | 0.797                                     | 0.294                                | 1.784                  | 0.689     |  |
|             | CEE     | 20    | 0.910         | 0.264                    | 0.556                                | 0.307                                | 1.452                  | 0.100                                | 0.092                                | 0.617                  | 0.556                                | 0.307                                | 6.074                    | -1.329                 | 0.105                                     | 0.294                                | 2.063                  | 0.585     |  |
|             |         | 18    | 1.174         | 0.340                    | 0.711                                | 0.392                                | 1.446                  | 0.127                                | 0.117                                | 0.611                  | 0.711                                | 0.392                                | 8.286                    | -1.322                 | 0.231                                     | 0.371                                | 2.052                  | 0.585     |  |
|             |         | 16    | 1.458         | 0.422                    | 0.873                                | 0.482                                | 1.438                  | 0.154                                | 0.142                                | 0.605                  | 0.873                                | 0.482                                | 14.446                   | -1.314                 | 0.451                                     | 0.449                                | 2.040                  | 0.585     |  |
|             |         | 14    | 1.809         | 0.524                    | 1.069                                | 0.590                                | 1.429                  | 0.186                                | 0.171                                | 0.596                  | 1.069                                | 0.590                                | 19.176                   | -1.305                 | 0.887                                     | 0.540                                | 2.024                  | 0.585     |  |
| JW          | 20      | 1.030 | 0.298         | 0.653                    | 0.360                                | 1.480                                | 0.178                  | 0.140                                | 0.774                                | 1.030                  | 0.610                                | 18.296                               | -1.757                   | 0.261                  | 0.726                                     | 2.418                                | 0.472                  |           |  |
|             | 18      | 1.331 | 0.385         | 0.837                    | 0.462                                | 1.474                                | 0.227                  | 0.178                                | 0.768                                | 1.331                  | 0.837                                | 22.940                               | -1.750                   | 0.511                  | 0.884                                     | 2.407                                | 0.471                  |           |  |
|             | 16      | 1.652 | 0.479         | 1.030                    | 0.568                                | 1.467                                | 0.277                  | 0.218                                | 0.761                                | 1.652                  | 1.030                                | 27.049                               | -1.741                   | 1.008                  | 1.070                                     | 2.393                                | 0.470                  |           |  |
|             | 14      | 2.055 | 0.595         | 1.265                    | 0.698                                | 1.458                                | 0.337                  | 0.265                                | 0.753                                | 2.055                  | 1.265                                | 32.770                               | -1.716                   | 2.863                  | 1.410                                     | 2.359                                | 0.471                  |           |  |
| JWE         | 18      | 1.486 | 0.430         | 0.981                    | 0.541                                | 1.510                                | 0.385                  | 0.248                                | 0.946                                | 1.486                  | 0.953                                | 32.770                               | -1.716                   | 2.863                  | 1.410                                     | 2.359                                | 0.471                  |           |  |
|             | 16      | 1.848 | 0.535         | 1.210                    | 0.668                                | 1.504                                | 0.473                  | 0.304                                | 0.940                                | 1.848                  | 1.150                                | 18.296                               | -2.222                   | 0.571                  | 1.489                                     | 2.843                                | 0.389                  |           |  |
|             | 14      | 2.301 | 0.666         | 1.491                    | 0.822                                | 1.496                                | 0.578                  | 0.371                                | 0.931                                | 2.301                  | 1.475                                | 24.173                               | -2.213                   | 1.129                  | 1.812                                     | 2.829                                | 0.388                  |           |  |
|             | 12      | 2.820 | 0.932         | 2.043                    | 1.127                                | 1.481                                | 0.781                  | 0.500                                | 0.915                                | 2.820                  | 2.043                                | 33.820                               | -2.187                   | 3.214                  | 2.409                                     | 2.795                                | 0.388                  |           |  |
| 4           | CN      | 20    | 0.866         | 0.251                    | 0.609                                | 0.304                                | 1.559                  | 0.062                                | 0.063                                | 0.498                  | 0.609                                | 0.304                                | 6.028                    | -0.903                 | 0.100                                     | 0.201                                | 1.909                  | 0.735     |  |
|             |         | 18    | 1.117         | 0.323                    | 0.777                                | 0.389                                | 1.551                  | 0.078                                | 0.079                                | 0.491                  | 0.777                                | 0.389                                | 7.859                    | -0.975                 | 0.219                                     | 0.253                                | 1.897                  | 0.736     |  |
|             |         | 16    | 1.384         | 0.401                    | 0.953                                | 0.477                                | 1.542                  | 0.094                                | 0.095                                | 0.484                  | 0.953                                | 0.477                                | 14.298                   | -0.967                 | 0.428                                     | 0.305                                | 1.884                  | 0.737     |  |
|             |         | 14    | 1.716         | 0.497                    | 1.165                                | 0.583                                | 1.531                  | 0.112                                | 0.113                                | 0.475                  | 1.165                                | 0.583                                | 20.144                   | -0.956                 | 0.842                                     | 0.365                                | 1.867                  | 0.738     |  |
|             | CEE     | 20    | 0.955         | 0.277                    | 0.698                                | 0.349                                | 1.589                  | 0.104                                | 0.093                                | 0.613                  | 0.698                                | 0.349                                | 6.910                    | -1.203                 | 0.110                                     | 0.359                                | 2.132                  | 0.638     |  |
|             |         | 18    | 1.233         | 0.357                    | 0.893                                | 0.447                                | 1.582                  | 0.131                                | 0.118                                | 0.606                  | 0.893                                | 0.447                                | 9.436                    | -1.276                 | 0.242                                     | 0.454                                | 2.121                  | 0.638     |  |
|             |         | 16    | 1.531         | 0.443                    | 1.098                                | 0.549                                | 1.574                  | 0.159                                | 0.143                                | 0.600                  | 1.098                                | 0.549                                | 16.466                   | -1.268                 | 0.473                                     | 0.550                                | 2.108                  | 0.638     |  |
|             |         | 14    | 1.901         | 0.550                    | 1.346                                | 0.673                                | 1.564                  | 0.192                                | 0.173                                | 0.591                  | 1.346                                | 0.673                                | 21.887                   | -1.258                 | 0.933                                     | 0.663                                | 2.092                  | 0.639     |  |
|             | JW      | 20    | 1.075         | 0.311                    | 0.818                                | 0.409                                | 1.621                  | 0.185                                | 0.142                                | 0.771                  | 1.032                                | 0.818                                | 32.382                   | -1.231                 | 2.644                                     | 0.864                                | 2.058                  | 0.642     |  |
|             |         | 18    | 1.389         | 0.402                    | 1.049                                | 0.524                                | 1.615                  | 0.235                                | 0.181                                | 0.765                  | 1.389                                | 1.049                                | 40.381                   | -1.709                 | 0.124                                     | 0.691                                | 2.479                  | 0.524     |  |
|             |         | 16    | 1.727         | 0.500                    | 1.292                                | 0.646                                | 1.608                  | 0.287                                | 0.220                                | 0.758                  | 1.727                                | 1.292                                | 50.381                   | -1.695                 | 0.534                                     | 1.068                                | 2.456                  | 0.524     |  |
|             |         | 14    | 2.148         | 0.622                    | 1.589                                | 0.795                                | 1.599                  | 0.349                                | 0.268                                | 0.750                  | 2.148                                | 1.589                                | 63.840                   | -1.686                 | 1.054                                     | 1.295                                | 2.441                  | 0.523     |  |
|             | JWE     | 18    | 1.545         | 0.447                    | 1.225                                | 0.612                                | 1.655                  | 0.399                                | 0.251                                | 0.945                  | 1.545                                | 1.087                                | 37.382                   | -1.660                 | 2.995                                     | 1.710                                | 2.408                  | 0.525     |  |
|             |         | 16    | 1.921         | 0.556                    | 1.512                                | 0.756                                | 1.649                  | 0.490                                | 0.308                                | 0.938                  | 1.921                                | 1.346                                | 46.931                   | -2.167                 | 0.303                                     | 1.473                                | 2.886                  | 0.436     |  |
|             |         | 14    | 2.393         | 0.693                    | 1.864                                | 0.932                                | 1.640                  | 0.599                                | 0.376                                | 0.929                  | 2.393                                | 1.844                                | 57.385                   | -2.151                 | 1.174                                     | 2.193                                | 2.860                  | 0.434     |  |
|             |         | 12    | 3.352         | 0.970                    | 2.561                                | 1.281                                | 1.625                  | 0.810                                | 0.507                                | 0.913                  | 3.352                                | 2.561                                | 88.417                   | -2.125                 | 3.345                                     | 2.923                                | 2.826                  | 0.435     |  |
| 5 1/2       | CEE     | 20    | 1.135         | 0.328                    | 1.470                                | 0.534                                | 2.115                  | 0.115                                | 0.096                                | 0.591                  | 1.470                                | 0.534                                | 10.581                   | -1.130                 | 0.131                                     | 0.706                                | 2.470                  | 0.791     |  |
|             |         | 18    | 1.467         | 0.425                    | 1.885                                | 0.686                                | 2.107                  | 0.145                                | 0.122                                | 0.584                  | 1.885                                | 0.686                                | 14.487                   | -1.122                 | 0.280                                     | 0.895                                | 2.458                  | 0.791     |  |
|             |         | 16    | 1.824         | 0.528                    | 2.324                                | 0.845                                | 2.098                  | 0.176                                | 0.148                                | 0.577                  | 2.324                                | 0.845                                | 25.356                   | -1.114                 | 0.564                                     | 1.088                                | 2.445                  | 0.792     |  |
|             |         | 14    | 2.271         | 0.657                    | 2.861                                | 1.040                                | 2.086                  | 0.212                                | 0.178                                | 0.569                  | 2.861                                | 1.040                                | 33.835                   | -1.103                 | 1.114                                     | 1.316                                | 2.428                  | 0.793     |  |

\* Contact DALE/INCOR for Availability

## Physical Properties

| WEB<br>(In) | SEC-<br>TION | GA.   | WT<br>(lb/ft) | GROSS SECTION PROPERTIES |                                      |                                      |                        |                                      |                                      |                        |                                      | EFFECTIVE PROPERTIES                 |                          |                        | TORSIONAL PROPERTIES         |                                      |                        |       |  |
|-------------|--------------|-------|---------------|--------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|--------------------------|------------------------|------------------------------|--------------------------------------|------------------------|-------|--|
|             |              |       |               | A<br>(In <sup>2</sup> )  | I <sub>x</sub><br>(In <sup>4</sup> ) | S <sub>x</sub><br>(In <sup>3</sup> ) | R <sub>x</sub><br>(In) | I <sub>y</sub><br>(In <sup>4</sup> ) | S <sub>y</sub><br>(In <sup>3</sup> ) | R <sub>y</sub><br>(In) | I <sub>x</sub><br>(In <sup>4</sup> ) | S <sub>x</sub><br>(In <sup>3</sup> ) | M <sub>x</sub><br>(In-k) | X <sub>o</sub><br>(In) | Jx1000<br>(In <sup>4</sup> ) | C <sub>w</sub><br>(In <sup>6</sup> ) | R <sub>o</sub><br>(In) | BETA  |  |
| 5 1/2       | JW           | 20    | 1.254         | 0.363                    | 1.705                                | 0.620                                | 2.167                  | 0.205                                | 0.147                                | 0.752                  | 1.672                                | 0.601                                | 11.895                   | -1.526                 | 0.145                        | 1.316                                | 2.755                  | 0.693 |  |
|             |              | 18    | 1.622         | 0.470                    | 2.191                                | 0.797                                | 2.160                  | 0.262                                | 0.187                                | 0.746                  | 2.191                                | 0.797                                | 15.774                   | -1.519                 | 0.318                        | 1.674                                | 2.744                  | 0.694 |  |
|             |              | 16    | 2.020         | 0.585                    | 2.706                                | 0.984                                | 2.152                  | 0.320                                | 0.228                                | 0.739                  | 2.706                                | 0.984                                | 29.525                   | -1.511                 | 0.624                        | 2.045                                | 2.731                  | 0.694 |  |
|             |              | 14    | 2.517         | 0.729                    | 3.341                                | 1.215                                | 2.141                  | 0.389                                | 0.278                                | 0.731                  | 3.341                                | 1.215                                | 36.443                   | -1.500                 | 1.235                        | 2.488                                | 2.715                  | 0.695 |  |
|             | CN           | 20    | 1.104         | 0.320                    | 1.595                                | 0.532                                | 2.233                  | 0.069                                | 0.065                                | 0.466                  | 1.595                                | 0.532                                | 10.529                   | -0.820                 | 0.128                        | 0.495                                | 2.425                  | 0.886 |  |
|             |              | 18    | 1.428         | 0.413                    | 2.044                                | 0.681                                | 2.224                  | 0.087                                | 0.082                                | 0.460                  | 2.044                                | 0.681                                | 13.779                   | -0.812                 | 0.280                        | 0.625                                | 2.412                  | 0.887 |  |
|             |              | 16    | 1.775         | 0.514                    | 2.518                                | 0.839                                | 2.213                  | 0.105                                | 0.098                                | 0.452                  | 2.518                                | 0.839                                | 25.176                   | -0.804                 | 0.549                        | 0.757                                | 2.398                  | 0.888 |  |
|             |              | 14    | 2.209         | 0.640                    | 3.094                                | 1.031                                | 2.200                  | 0.125                                | 0.117                                | 0.443                  | 3.094                                | 1.031                                | 35.670                   | -0.793                 | 1.084                        | 0.911                                | 2.380                  | 0.889 |  |
|             | CEE          | 20    | 1.195         | 0.346                    | 1.806                                | 0.602                                | 2.285                  | 0.117                                | 0.097                                | 0.583                  | 1.806                                | 0.602                                | 11.920                   | -1.088                 | 0.138                        | 0.854                                | 2.597                  | 0.825 |  |
|             |              | 18    | 1.545         | 0.447                    | 2.318                                | 0.773                                | 2.277                  | 0.149                                | 0.123                                | 0.577                  | 2.318                                | 0.773                                | 16.330                   | -1.080                 | 0.303                        | 1.083                                | 2.585                  | 0.825 |  |
|             |              | 16    | 1.921         | 0.556                    | 2.860                                | 0.953                                | 2.267                  | 0.180                                | 0.149                                | 0.570                  | 2.860                                | 0.953                                | 28.604                   | -1.072                 | 0.594                        | 1.318                                | 2.572                  | 0.826 |  |
|             |              | 14    | 2.393         | 0.693                    | 3.525                                | 1.175                                | 2.255                  | 0.218                                | 0.180                                | 0.561                  | 3.525                                | 1.175                                | 38.207                   | -1.061                 | 1.174                        | 1.596                                | 2.554                  | 0.828 |  |
| JW          | 12           | 3.352 | 0.970         | 4.841                    | 1.614                                | 2.234                                | 0.287                  | 0.237                                | 0.544                                | 4.841                  | 1.614                                | 57.037                               | -1.035                   | 3.345                  | 2.102                        | 2.521                                | 0.832                  |       |  |
|             | 20           | 1.313 | 0.380         | 2.088                    | 0.696                                | 2.343                                | 0.211                  | 0.148                                | 0.745                                | 2.049                  | 0.675                                | 13.371                               | -1.475                   | 0.152                  | 1.581                        | 2.867                                | 0.735                  |       |  |
|             | 18           | 1.700 | 0.492         | 2.685                    | 0.895                                | 2.336                                | 0.269                  | 0.189                                | 0.739                                | 2.685                  | 0.895                                | 17.722                               | -1.467                   | 0.334                  | 2.013                        | 2.855                                | 0.736                  |       |  |
|             | 16           | 2.117 | 0.613         | 3.319                    | 1.106                                | 2.327                                | 0.329                  | 0.230                                | 0.732                                | 3.319                  | 1.106                                | 33.194                               | -1.459                   | 0.655                  | 2.461                        | 2.842                                | 0.737                  |       |  |
| JWE         | 14           | 2.640 | 0.764         | 4.101                    | 1.367                                | 2.316                                | 0.400                  | 0.280                                | 0.723                                | 4.101                  | 1.367                                | 41.006                               | -1.448                   | 1.295                  | 2.997                        | 2.826                                | 0.737                  |       |  |
|             | 12           | 3.703 | 1.072         | 5.656                    | 1.885                                | 2.297                                | 0.536                  | 0.376                                | 0.707                                | 5.656                  | 1.885                                | 64.813                               | -1.422                   | 3.696                  | 3.995                        | 2.792                                | 0.741                  |       |  |
|             | 18           | 1.856 | 0.537         | 3.085                    | 1.028                                | 2.396                                | 0.458                  | 0.263                                | 0.923                                | 3.067                  | 1.019                                | 20.168                               | -1.897                   | 0.364                  | 3.380                        | 3.193                                | 0.647                  |       |  |
|             | 16           | 2.312 | 0.670         | 3.819                    | 1.273                                | 2.388                                | 0.562                  | 0.323                                | 0.917                                | 3.632                  | 1.170                                | 35.112                               | -1.889                   | 0.715                  | 4.146                        | 3.180                                | 0.647                  |       |  |
| SCJ         | 14           | 2.887 | 0.836         | 4.727                    | 1.576                                | 2.378                                | 0.688                  | 0.395                                | 0.908                                | 4.669                  | 1.542                                | 46.254                               | -1.878                   | 1.416                  | 5.071                        | 3.164                                | 0.647                  |       |  |
|             | 12           | 4.054 | 1.174         | 6.540                    | 2.180                                | 2.361                                | 0.932                  | 0.535                                | 0.891                                | 6.540                  | 2.180                                | 65.404                               | -1.851                   | 4.047                  | 6.819                        | 3.129                                | 0.650                  |       |  |
|             | 10*          | 4.904 | 1.420         | 7.832                    | 2.611                                | 2.349                                | 1.100                  | 0.631                                | 0.880                                | 7.832                  | 2.611                                | 78.322                               | -1.828                   | 7.301                  | 7.981                        | 3.104                                | 0.653                  |       |  |
|             | 16           | 2.801 | 0.811         | 4.962                    | 1.654                                | 2.474                                | 1.422                  | 0.629                                | 1.324                                | 4.624                  | 1.472                                | 44.170                               | -2.977                   | 0.866                  | 11.508                       | 4.091                                | 0.470                  |       |  |
| 7 1/4       | CEE          | 14    | 3.502         | 1.014                    | 6.161                                | 2.054                                | 2.465                  | 1.754                                | 0.775                                | 1.315                  | 5.840                                | 1.873                                | 56.199                   | -2.967                 | 1.718                        | 14.162                               | 4.076                  | 0.470 |  |
|             |              | 12    | 4.932         | 1.428                    | 8.567                                | 2.856                                | 2.449                  | 2.412                                | 1.065                                | 1.300                  | 8.486                                | 2.805                                | 84.135                   | -2.940                 | 4.923                        | 19.281                               | 4.042                  | 0.471 |  |
|             |              | 10*   | 5.976         | 1.730                    | 10.291                               | 3.430                                | 2.439                  | 2.874                                | 1.269                                | 1.289                  | 10.291                               | 3.430                                | 102.909                  | -2.917                 | 8.897                        | 22.765                               | 4.015                  | 0.472 |  |
|             |              | 20    | 1.344         | 0.389                    | 2.841                                | 0.784                                | 2.702                  | 0.123                                | 0.098                                | 0.563                  | 2.841                                | 0.784                                | 15.517                   | -0.996                 | 0.155                        | 1.299                                | 2.935                  | 0.885 |  |
|             | JW           | 18    | 1.740         | 0.504                    | 3.652                                | 1.007                                | 2.693                  | 0.156                                | 0.125                                | 0.557                  | 3.652                                | 1.007                                | 21.288                   | -0.988                 | 0.341                        | 1.649                                | 2.922                  | 0.886 |  |
|             |              | 16    | 2.166         | 0.627                    | 4.513                                | 1.245                                | 2.683                  | 0.190                                | 0.151                                | 0.550                  | 4.513                                | 1.245                                | 37.347                   | -0.980                 | 0.670                        | 2.010                                | 2.908                  | 0.887 |  |
|             |              | 14    | 2.702         | 0.782                    | 5.572                                | 1.537                                | 2.669                  | 0.229                                | 0.182                                | 0.541                  | 5.572                                | 1.537                                | 49.986                   | -0.969                 | 1.325                        | 2.439                                | 2.891                  | 0.888 |  |
|             |              | 12    | 3.791         | 1.097                    | 7.682                                | 2.119                                | 2.646                  | 0.302                                | 0.241                                | 0.525                  | 7.682                                | 2.119                                | 74.896                   | -0.943                 | 3.784                        | 3.225                                | 2.857                  | 0.891 |  |
|             | JWE          | 16    | 2.362         | 0.684                    | 5.195                                | 1.433                                | 2.756                  | 0.347                                | 0.234                                | 0.713                  | 4.197                                | 1.158                                | 22.922                   | -1.354                 | 0.372                        | 3.031                                | 3.162                  | 0.817 |  |
|             |              | 14    | 2.940         | 0.853                    | 6.428                                | 1.733                                | 2.744                  | 0.423                                | 0.285                                | 0.704                  | 5.195                                | 1.433                                | 49.990                   | -1.345                 | 0.730                        | 3.711                                | 3.149                  | 0.817 |  |
|             |              | 12    | 4.142         | 1.199                    | 8.895                                | 2.454                                | 2.723                  | 0.567                                | 0.382                                | 0.688                  | 6.428                                | 1.773                                | 53.200                   | -1.334                 | 1.446                        | 4.520                                | 3.132                  | 0.818 |  |
|             |              | 18    | 2.050         | 0.594                    | 4.782                                | 1.319                                | 2.838                  | 0.486                                | 0.269                                | 0.905                  | 4.756                                | 1.307                                | 25.888                   | -1.764                 | 0.403                        | 5.090                                | 3.462                  | 0.740 |  |
| SCJ         | 16           | 2.557 | 0.740         | 5.927                    | 1.635                                | 2.830                                | 0.597                  | 0.330                                | 0.898                                | 5.644                  | 1.509                                | 45.283                               | -1.756                   | 0.791                  | 6.251                        | 3.449                                | 0.741                  |       |  |
|             | 14           | 3.194 | 0.925         | 7.347                    | 2.027                                | 2.819                                | 0.730                  | 0.403                                | 0.889                                | 7.256                  | 1.984                                | 59.518                               | -1.745                   | 1.567                  | 7.658                        | 3.432                                | 0.742                  |       |  |
|             | 12           | 4.493 | 1.301         | 10.194                   | 2.812                                | 2.799                                | 0.989                  | 0.546                                | 0.872                                | 10.194                 | 2.812                                | 84.362                               | -1.718                   | 4.405                  | 10.334                       | 3.398                                | 0.744                  |       |  |
|             | 20           | 1.344 | 0.389         | 3.221                    | 0.805                                | 2.878                                | 0.074                  | 0.066                                | 0.437                                | 3.211                  | 0.801                                | 13.512                               | -0.707                   | 0.155                  | 0.950                        | 2.995                                | 0.944                  |       |  |
| 8           | CN           | 16    | 2.166         | 0.627                    | 5.110                                | 1.277                                | 2.855                  | 0.112                                | 0.100                                | 0.423                  | 4.138                                | 1.035                                | 20.799                   | -0.699                 | 0.341                        | 1.202                                | 2.982                  | 0.945 |  |
|             |              | 14    | 2.702         | 0.782                    | 6.303                                | 1.576                                | 2.839                  | 0.134                                | 0.120                                | 0.414                  | 5.110                                | 1.277                                | 38.323                   | -0.691                 | 0.670                        | 1.460                                | 2.967                  | 0.946 |  |
|             |              | 20    | 1.433         | 0.415                    | 3.606                                | 0.901                                | 2.948                  | 0.127                                | 0.099                                | 0.552                  | 3.596                                | 0.897                                | 15.405                   | -0.949                 | 0.166                        | 1.619                                | 3.145                  | 0.909 |  |
|             |              | 18    | 1.856         | 0.537                    | 4.638                                | 1.159                                | 2.938                  | 0.160                                | 0.125                                | 0.546                  | 4.638                                | 1.159                                | 27.812                   | -0.941                 | 0.364                        | 2.057                                | 3.133                  | 0.910 |  |
|             | CEE          | 16    | 2.312         | 0.670                    | 5.736                                | 1.434                                | 2.927                  | 0.194                                | 0.152                                | 0.539                  | 5.736                                | 1.434                                | 43.018                   | -0.932                 | 0.715                        | 2.509                                | 3.119                  | 0.911 |  |
|             |              | 14    | 2.887         | 0.836                    | 7.089                                | 1.772                                | 2.913                  | 0.235                                | 0.184                                | 0.530                  | 7.089                                | 1.772                                | 57.635                   | -0.921                 | 1.416                        | 3.047                                | 3.101                  | 0.912 |  |
|             |              | 12    | 4.054         | 1.174                    | 9.791                                | 2.448                                | 2.888                  | 0.309                                | 0.243                                | 0.513                  | 9.791                                | 2.448                                | 86.513                   | -0.896                 | 4.047                        | 4.036                                | 3.067                  | 0.915 |  |
|             |              | 20    | 1.553         | 0.450                    | 4.119                                | 1.030                                | 3.027                  | 0.229                                | 0.152                                | 0.714                  | 4.065                                | 1.009                                | 18.902                   | -1.303                 | 0.179                        | 2.952                                | 3.372                  | 0.851 |  |
|             | JW           | 16    | 2.508         | 0.726                    | 6.573                                | 1.643                                | 3.009                  | 0.357                                | 0.236                                | 0.701                  | 5.306                                | 1.327                                | 26.266                   | -1.295                 | 0.395                        | 3.764                                | 3.360                  | 0.851 |  |
|             |              | 14    | 3.132         | 0.907                    | 8.141                                | 2.035                                | 2.996                  | 0.435                                | 0.287                                | 0.692                  | 6.573                                | 1.643                                | 49.294                   | -1.286                 | 0.775                        | 4.612                                | 3.346                  | 0.852 |  |
|             |              | 12    | 4.405         | 1.275                    | 11.281                               | 2.820                                | 2.974                  | 0.583                                | 0.386                                | 0.676                  | 8.141                                | 2.035                                | 61.054                   | -1.275                 | 1.537                        | 5.631                                | 3.329                  | 0.853 |  |
|             |              | 18    | 2.168         | 0.628                    | 6.020                                | 1.505                                | 3.097                  | 0.500                                | 0.271                                | 0.893                  | 11.281                               | 2.820                                | 96.956                   | -1.249                 | 4.397                        | 7.548                                | 3.296                  | 0.856 |  |
| JWE         | 16           | 2.704 | 0.783         | 7.465                    | 1.866                                | 3.088                                | 0.614                  | 0.333                                | 0.886                                | 5.988                  | 1.492                                | 29.545                               | -1.694                   | 0.425                  | 6.322                        | 3.641                                | 0.784                  |       |  |
|             | 14           | 3.379 | 0.978         | 9.261                    | 2.315                                | 3.077                                | 0.752                  | 0.407                                | 0.877                                | 7.116                  | 1.727                                | 51.818                               | -1.686                   | 0.836                  | 7.769                        | 3.628                                | 0.784                  |       |  |
|             | 12           | 4.756 | 1.377         | 12.867                   | 3.217                                | 3.057                                | 1.019                  | 0.551                                | 0.860                                | 9.146                  | 2.267                                | 68.016                               | -1.674                   | 1.658                  | 9.526                        | 3.611                                | 0.785                  |       |  |
|             | 10*          | 5.762 | 1.668         | 15.452                   | 3.863                                | 3.043                                | 1.202                  | 0.651                                | 0.849                                | 12.867                 | 3.217                                | 96.504                               | -1.647                   | 4.748                  | 12.874                       | 3.577                                | 0.788                  |       |  |
| SCJ         | 16           | 3.192 | 0.924         | 9.550                    | 2.388                                | 3.215                                | 1.567                  | 0.651                                | 1.302                                | 15.452                 | 3.863                                | 115.894                              | -1.626                   | 8.578                  | 15.121                       | 3.553                                | 0.791                  |       |  |
|             | 14           | 3.995 | 1.156         | 11.879                   | 2.970                                | 3.205                                | 1.935                  | 0.803                                | 1.293                                | 8.949                  | 2.149                                | 64.478                               | -2.708                   | 0.907                  | 20.765                       | 4.400                                | 0.621                  |       |  |
|             | 12           | 5.635 | 1.631         | 16.577                   | 4.144                                | 3.188                                | 2.662                  | 1.103                                | 1.277                                | 11.278                 | 2.723                                | 81.691                               | -2.698                   | 1.960                  | 25.608                       | 4.384                                | 0.621                  |       |  |
|             | 10*          | 6.835 | 1.979         | 19.961                   | 4.990                                | 3.176                                | 3.173                  | 1.315                                | 1.266                                | 16.405                 | 4.068                                | 122.040                              | -2.670                   | 5.624                  | 35.018                       | 4.350                                | 0.623                  |       |  |
|             |              |       |               |                          |                                      |                                      |                        |                                      |                                      |                        |                                      |                                      |                          |                        |                              |                                      |                        |       |  |
|             |              |       |               |                          |                                      |                                      |                        |                                      |                                      |                        |                                      |                                      |                          |                        |                              |                                      |                        |       |  |
|             |              |       |               |                          |                                      |                                      |                        |                                      |                                      |                        |                                      |                                      |                          |                        |                              |                                      |                        |       |  |
|             |              |       |               |                          |                                      |                                      |                        |                                      |                                      | </                     |                                      |                                      |                          |                        |                              |                                      |                        |       |  |



## Physical Properties

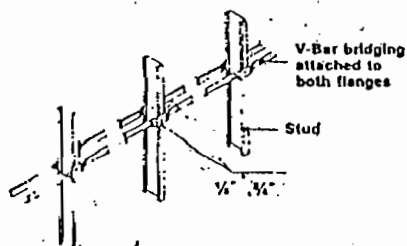
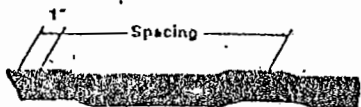
| WEB<br>(in) | SECTION | GA    | WT<br>(lb/ft) | GROSS SECTION PROPERTIES |                                      |                                      |                        |                                      |                                      |                        |                                      | EFFECTIVE PROPERTIES                 |                          |                        | TORSIONAL PROPERTIES                      |                                      |                        |           |       |
|-------------|---------|-------|---------------|--------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|--------------------------|------------------------|-------------------------------------------|--------------------------------------|------------------------|-----------|-------|
|             |         |       |               | A<br>(in <sup>2</sup> )  | I <sub>x</sub><br>(in <sup>4</sup> ) | S <sub>x</sub><br>(in <sup>3</sup> ) | R <sub>x</sub><br>(in) | I <sub>y</sub><br>(in <sup>4</sup> ) | S <sub>y</sub><br>(in <sup>3</sup> ) | R <sub>y</sub><br>(in) | I <sub>x</sub><br>(in <sup>4</sup> ) | S <sub>x</sub><br>(in <sup>3</sup> ) | M <sub>x</sub><br>(in-k) | X <sub>o</sub><br>(in) | J <sub>x</sub> 1000<br>(in <sup>4</sup> ) | C <sub>w</sub><br>(in <sup>6</sup> ) | R <sub>o</sub><br>(in) | B<br>BETA |       |
| 9 1/4       | CEE     | 18    | 2.050         | 0.594                    | 6.622                                | 1.432                                | 3.340                  | 0.166                                | 0.127                                | 0.528                  | 6.622                                | 1.432                                | 28.349                   | -0.872                 | 0.403                                     | 2.854                                | 3.492                  | 0.938     |       |
|             |         | 16    | 2.557         | 0.740                    | 8.198                                | 1.773                                | 3.328                  | 0.201                                | 0.154                                | 0.521                  | 8.198                                | 1.773                                | 53.179                   | -0.863                 | 0.791                                     | 3.485                                | 3.477                  | 0.930     |       |
|             |         | 14    | 3.194         | 0.925                    | 10.148                               | 2.194                                | 3.313                  | 0.243                                | 0.186                                | 0.512                  | 10.148                               | 2.194                                | 71.352                   | -0.853                 | 1.567                                     | 4.237                                | 3.459                  | 0.939     |       |
|             |         | 12    | 4.493         | 1.301                    | 14.051                               | 3.038                                | 3.287                  | 0.320                                | 0.245                                | 0.496                  | 14.051                               | 3.038                                | 107.375                  | -0.828                 | 4.485                                     | 5.625                                | 3.425                  | 0.942     |       |
|             | JW      | 18    | 2.207         | 0.639                    | 7.524                                | 1.627                                | 3.432                  | 0.303                                | 0.195                                | 0.689                  | 7.524                                | 1.627                                | 32.213                   | -1.208                 | 0.433                                     | 5.199                                | 3.703                  | 0.894     |       |
|             |         | 16    | 2.753         | 0.797                    | 9.329                                | 2.017                                | 3.422                  | 0.371                                | 0.239                                | 0.682                  | 9.329                                | 2.017                                | 60.512                   | -1.199                 | 0.851                                     | 6.375                                | 3.689                  | 0.894     |       |
|             |         | 14    | 3.441         | 0.996                    | 11.569                               | 2.501                                | 3.408                  | 0.451                                | 0.291                                | 0.673                  | 11.569                               | 2.501                                | 75.039                   | -1.188                 | 1.688                                     | 7.794                                | 3.671                  | 0.895     |       |
|             |         | 12    | 4.845         | 1.403                    | 16.066                               | 3.474                                | 3.385                  | 0.605                                | 0.390                                | 0.657                  | 16.066                               | 3.474                                | 119.424                  | -1.163                 | 4.836                                     | 10.469                               | 3.639                  | 0.898     |       |
|             | JWE     | 18    | 2.362         | 0.684                    | 8.400                                | 1.833                                | 3.521                  | 0.521                                | 0.275                                | 0.873                  | 8.437                                | 1.819                                | 36.014                   | -1.590                 | 0.464                                     | 8.736                                | 3.961                  | 0.839     |       |
|             |         | 16    | 2.948         | 0.853                    | 10.525                               | 2.276                                | 3.512                  | 0.640                                | 0.337                                | 0.866                  | 10.050                               | 2.114                                | 63.428                   | -1.581                 | 0.911                                     | 10.744                               | 3.947                  | 0.840     |       |
|             |         | 14    | 3.606         | 1.067                    | 13.070                               | 2.826                                | 3.499                  | 0.783                                | 0.412                                | 0.857                  | 12.910                               | 2.769                                | 103.077                  | -1.570                 | 1.809                                     | 13.188                               | 3.930                  | 0.840     |       |
|             |         | 12    | 5.196         | 1.504                    | 18.194                               | 3.934                                | 3.478                  | 1.061                                | 0.559                                | 0.840                  | 18.194                               | 3.934                                | 118.017                  | -1.544                 | 5.186                                     | 17.861                               | 3.897                  | 0.843     |       |
| 10          | CEE     | 18    | 2.168         | 0.628                    | 8.032                                | 1.606                                | 3.578                  | 0.168                                | 0.127                                | 0.518                  | 8.032                                | 1.606                                | 31.807                   | -0.835                 | 0.425                                     | 3.405                                | 3.710                  | 0.949     |       |
|             |         | 16    | 2.709         | 0.783                    | 9.950                                | 1.990                                | 3.565                  | 0.204                                | 0.155                                | 0.511                  | 9.950                                | 1.990                                | 59.701                   | -0.827                 | 0.836                                     | 4.160                                | 3.696                  | 0.950     |       |
|             |         | 14    | 3.379         | 0.978                    | 12.325                               | 2.465                                | 3.550                  | 0.247                                | 0.186                                | 0.502                  | 12.325                               | 2.465                                | 80.162                   | -0.817                 | 1.658                                     | 5.060                                | 3.677                  | 0.951     |       |
|             |         | 12    | 4.756         | 1.377                    | 17.080                               | 3.418                                | 3.523                  | 0.325                                | 0.246                                | 0.486                  | 17.080                               | 3.418                                | 120.792                  | -0.793                 | 4.748                                     | 6.725                                | 3.643                  | 0.953     |       |
|             | JW      | 18    | 2.323         | 0.673                    | 9.092                                | 1.818                                | 3.677                  | 0.309                                | 0.196                                | 0.678                  | 9.092                                | 1.818                                | 36.005                   | -1.162                 | 0.456                                     | 6.191                                | 3.915                  | 0.912     |       |
|             |         | 16    | 2.899         | 0.839                    | 11.278                               | 2.256                                | 3.666                  | 0.378                                | 0.240                                | 0.671                  | 11.278                               | 2.256                                | 67.668                   | -1.153                 | 0.896                                     | 7.595                                | 3.901                  | 0.913     |       |
|             |         | 14    | 3.626         | 1.050                    | 13.994                               | 2.799                                | 3.652                  | 0.460                                | 0.292                                | 0.662                  | 13.994                               | 2.799                                | 83.966                   | -1.142                 | 1.779                                     | 9.291                                | 3.883                  | 0.913     |       |
|             |         | 12    | 5.108         | 1.479                    | 19.457                               | 3.891                                | 3.627                  | 0.616                                | 0.392                                | 0.646                  | 19.457                               | 3.891                                | 113.781                  | -1.117                 | 5.099                                     | 12.492                               | 3.850                  | 0.916     |       |
|             | JWE     | 18    | 2.480         | 0.718                    | 10.210                               | 2.042                                | 3.772                  | 0.532                                | 0.276                                | 0.861                  | 10.160                               | 2.026                                | 40.120                   | -1.534                 | 0.487                                     | 10.407                               | 4.162                  | 0.864     |       |
|             |         | 16    | 3.095         | 0.896                    | 12.677                               | 2.535                                | 3.762                  | 0.653                                | 0.339                                | 0.854                  | 12.117                               | 2.361                                | 70.824                   | -1.525                 | 0.957                                     | 12.806                               | 4.148                  | 0.865     |       |
|             |         | 14    | 3.871         | 1.121                    | 15.752                               | 3.150                                | 3.749                  | 0.799                                | 0.415                                | 0.844                  | 15.560                               | 3.088                                | 92.651                   | -1.514                 | 1.899                                     | 15.726                               | 4.130                  | 0.866     |       |
|             |         | 12    | 5.460         | 1.581                    | 21.948                               | 4.390                                | 3.726                  | 1.083                                | 0.562                                | 0.828                  | 21.948                               | 4.390                                | 131.690                  | -1.488                 | 5.449                                     | 21.320                               | 4.097                  | 0.868     |       |
|             | SCJ     | 10*   | 6.620         | 1.917                    | 26.409                               | 5.282                                | 3.712                  | 1.277                                | 0.664                                | 0.816                  | 26.409                               | 5.282                                | 158.455                  | -1.467                 | 9.855                                     | 25.095                               | 4.074                  | 0.870     |       |
|             |         | 16    | 3.583         | 1.037                    | 15.986                               | 3.197                                | 3.926                  | 1.681                                | 0.666                                | 1.273                  | 15.215                               | 2.955                                | 178.414                  | -2.490                 | 1.108                                     | 33.549                               | 4.820                  | 0.733     |       |
|             |         | 14    | 4.487         | 1.299                    | 19.910                               | 3.982                                | 3.915                  | 2.076                                | 0.822                                | 1.264                  | 18.940                               | 3.671                                | 110.118                  | -2.479                 | 2.201                                     | 41.434                               | 4.803                  | 0.734     |       |
|             |         | 12    | 6.338         | 1.835                    | 27.849                               | 5.570                                | 3.896                  | 2.856                                | 1.130                                | 1.248                  | 27.554                               | 5.469                                | 164.074                  | -2.452                 | 6.326                                     | 56.822                               | 4.769                  | 0.736     |       |
| 10*         | 7.693   | 2.227 | 33.588        | 6.718                    | 3.883                                | 3.405                                | 1.340                  | 1.237                                | 33.588                               | 6.718                  | 201.528                              | -2.429                               | 11.452                   | 67.453                 | 4.745                                     | 0.738                                |                        |           |       |
| 11 1/2      | CEE     | 18    | 2.401         | 0.695                    | 11.392                               | 1.981                                | 4.048                  | 0.173                                | 0.128                                | 0.499                  | 11.279                               | 1.951                                | 33.063                   | -0.772                 | 0.471                                     | 4.674                                | 4.151                  | 0.965     |       |
|             |         | 16    | 2.997         | 0.868                    | 14.126                               | 2.457                                | 4.035                  | 0.210                                | 0.156                                | 0.492                  | 14.126                               | 2.457                                | 60.769                   | -0.763                 | 0.927                                     | 5.713                                | 4.136                  | 0.966     |       |
|             |         | 14    | 3.748         | 1.085                    | 17.521                               | 3.047                                | 4.018                  | 0.253                                | 0.188                                | 0.483                  | 17.521                               | 3.047                                | 91.413                   | -0.753                 | 1.839                                     | 6.958                                | 4.117                  | 0.967     |       |
|             |         | 12    | 5.284         | 1.530                    | 24.346                               | 4.234                                | 3.989                  | 0.334                                | 0.248                                | 0.467                  | 24.346                               | 4.234                                | 119.650                  | -0.730                 | 5.274                                     | 9.262                                | 4.083                  | 0.968     |       |
|             | JW      | 18    | 2.618         | 0.740                    | 12.805                               | 2.227                                | 4.159                  | 0.319                                | 0.198                                | 0.656                  | 12.709                               | 2.201                                | 136.908                  | -1.080                 | 0.502                                     | 8.480                                | 4.347                  | 0.938     |       |
|             |         | 16    | 3.192         | 0.924                    | 15.896                               | 2.765                                | 4.147                  | 0.390                                | 0.242                                | 0.650                  | 15.896                               | 2.765                                | 164.182                  | -1.071                 | 0.987                                     | 10.410                               | 4.332                  | 0.939     |       |
|             |         | 14    | 4.022         | 1.156                    | 19.747                               | 3.434                                | 4.132                  | 0.475                                | 0.295                                | 0.641                  | 19.747                               | 3.434                                | 110.026                  | -1.061                 | 1.960                                     | 12.746                               | 4.314                  | 0.940     |       |
|             |         | 12    | 5.635         | 1.631                    | 27.508                               | 4.784                                | 4.106                  | 0.636                                | 0.396                                | 0.624                  | 27.508                               | 4.784                                | 164.466                  | -1.036                 | 5.624                                     | 17.167                               | 4.281                  | 0.941     |       |
| 12          | CEE     | 16    | 3.095         | 0.896                    | 15.730                               | 2.622                                | 4.190                  | 0.212                                | 0.156                                | 0.486                  | 15.597                               | 2.588                                | 163.474                  | -0.744                 | 0.957                                     | 6.293                                | 4.283                  | 0.970     |       |
|             |         | 14    | 3.871         | 1.121                    | 19.518                               | 3.253                                | 4.173                  | 0.255                                | 0.188                                | 0.477                  | 19.518                               | 3.253                                | 97.590                   | -0.734                 | 1.899                                     | 7.666                                | 4.264                  | 0.970     |       |
|             |         | 12    | 5.460         | 1.581                    | 27.140                               | 4.523                                | 4.144                  | 0.336                                | 0.249                                | 0.461                  | 27.140                               | 4.523                                | 1159.869                 | -0.711                 | 5.449                                     | 10.208                               | 4.230                  | 0.972     |       |
|             |         | 16    | 3.290         | 0.953                    | 17.662                               | 2.944                                | 4.306                  | 0.394                                | 0.243                                | 0.643                  | 17.662                               | 2.944                                | 167.057                  | -1.047                 | 1.017                                     | 11.462                               | 4.478                  | 0.945     |       |
|             | JW      | 14    | 4.118         | 1.192                    | 21.947                               | 3.658                                | 4.291                  | 0.479                                | 0.296                                | 0.634                  | 21.947                               | 3.658                                | 1109.736                 | -1.036                 | 2.020                                     | 14.038                               | 4.459                  | 0.946     |       |
|             |         | 12    | 5.811         | 1.682                    | 30.591                               | 5.099                                | 4.264                  | 0.642                                | 0.397                                | 0.618                  | 30.591                               | 5.099                                | 1175.278                 | -1.012                 | 5.800                                     | 18.915                               | 4.426                  | 0.948     |       |
|             |         | 16    | 3.486         | 1.009                    | 19.681                               | 3.280                                | 4.416                  | 0.683                                | 0.344                                | 0.823                  | 19.681                               | 3.280                                | 69.815                   | -1.395                 | 1.078                                     | 19.354                               | 4.704                  | 0.912     |       |
|             |         | 14    | 4.363         | 1.263                    | 24.484                               | 4.081                                | 4.402                  | 0.836                                | 0.421                                | 0.813                  | 24.197                               | 4.005                                | 120.150                  | -1.384                 | 2.141                                     | 23.796                               | 4.686                  | 0.913     |       |
|             | JWE     | 12    | 6.162         | 1.784                    | 34.190                               | 5.698                                | 4.378                  | 1.132                                | 0.570                                | 0.797                  | 34.190                               | 5.698                                | 170.952                  | -1.359                 | 6.150                                     | 32.328                               | 4.653                  | 0.915     |       |
|             |         | 10*   | 7.479         | 2.165                    | 41.199                               | 6.867                                | 4.362                  | 1.335                                | 0.673                                | 0.785                  | 41.199                               | 6.867                                | 205.996                  | -1.339                 | 11.132                                    | 38.105                               | 4.630                  | 0.916     |       |
|             |         | 16    | 3.975         | 1.151                    | 24.498                               | 4.083                                | 4.614                  | 1.773                                | 0.677                                | 1.241                  | 23.797                               | 3.900                                | 183.500                  | -2.308                 | 1.229                                     | 50.153                               | 5.306                  | 0.811     |       |
|             |         | 14    | 4.980         | 1.442                    | 30.539                               | 5.090                                | 4.602                  | 2.189                                | 0.836                                | 1.232                  | 29.114                               | 4.715                                | 141.451                  | -2.297                 | 2.443                                     | 62.004                               | 5.289                  | 0.811     |       |
| SCJ         | 12      | 7.040 | 2.036         | 42.791                   | 7.132                                | 4.582                                | 3.012                  | 1.150                                | 1.216                                | 42.340                 | 7.007                                | 210.211                              | -2.270                   | 7.027                  | 85.202                                    | 5.256                                | 0.814                  |           |       |
|             | 10*     | 8.550 | 2.476         | 51.670                   | 8.612                                | 4.569                                | 3.591                  | 1.372                                | 1.204                                | 51.670                 | 8.612                                | 258.348                              | -2.248                   | 12.729                 | 101.285                                   | 5.232                                | 0.815                  |           |       |
|             | 13 1/2  | JW    | 16            | 3.583                    | 1.037                                | 23.688                               | 3.509                  | 4.778                                | 0.403                                | 0.244                  | 0.623                                | 22.984                               | 3.348                    | 75.742                 | -0.980                                    | 1.108                                | 14.965                 | 4.918     | 0.960 |
|             |         |       | 14            | 4.487                    | 1.299                                | 29.461                               | 4.365                  | 4.762                                | 0.491                                | 0.298                  | 0.615                                | 29.461                               | 4.365                    | 112.586                | -0.969                                    | 2.201                                | 18.341                 | 4.899     | 0.961 |
| 12          |         |       | 6.338         | 1.835                    | 41.127                               | 6.093                                | 4.734                  | 0.657                                | 0.400                                | 0.599                  | 41.127                               | 6.093                                | 209.464                  | -0.946                 | 6.326                                     | 24.742                               | 4.865                  | 0.962     |       |
| 16          |         |       | 3.779         | 1.094                    | 26.245                               | 3.888                                | 4.898                  | 0.701                                | 0.346                                | 0.801                  | 25.791                               | 3.782                                | 78.080                   | -1.313                 | 1.168                                     | 25.303                               | 5.134                  | 0.935     |       |
| JWE         |         | 14    | 4.733         | 1.370                    | 32.675                               | 4.841                                | 4.883                  | 0.858                                | 0.424                                | 0.791                  | 32.547                               | 4.811                                | 131.885                  | -1.302                 | 2.322                                     | 31.131                               | 5.115                  | 0.935     |       |
|             |         | 12    | 6.689         | 1.937                    | 45.691                               | 6.769                                | 4.857                  | 1.162                                | 0.575                                | 0.775                  | 45.691                               | 6.769                                | 203.072                  | -1.277                 | 6.676                                     | 42.342                               | 5.082                  | 0.937     |       |
|             |         | 16    | 3.681         | 1.066                    | 25.951                               | 3.707                                | 4.935                  | 0.406                                | 0.245                                | 0.617                  | 24.917                               | 3.480                                | 78.657                   | -0.959                 | 1.130                                     | 16.250                               | 5.065                  | 0.964     |       |
|             |         | 14    | 4.610         | 1.335                    | 32.284                               | 4.612                                | 4.918                  | 0.494                                | 0.298                                | 0.608                  | 32.284                               | 4.612                                | 116.824                  | -0.949                 | 2.262                                     | 19.920                               | 5.046                  | 0.965     |       |
| JWE         | 12      | 6.513 | 1.886         | 45.089                   | 6.441                                | 4.890                                | 0.662                  | 0.401                                | 0.592                                | 45.089                 | 6.441                                | 217.154                              | -0.926                   | 6.501                  | 26.881                                    | 5.012                                | 0.966                  |           |       |
|             | 16      | 3.876 | 1.122         | 28.702                   | 4.100                                | 5.057                                | 0.707                  | 0.347                                | 0.794                                | 27.934</               |                                      |                                      |                          |                        |                                           |                                      |                        |           |       |

## Physical Properties

| WEB<br>(In) | SEC-<br>TION | GA | WT<br>(lb/ft) | GROSS SECTION PROPERTIES |                                      |                                      |                        |                                      |                                      |                        | EFFECTIVE PROPERTIES                 |                                      |                          | TORSIONAL PROPERTIES   |                                           |                                      |                        |           |
|-------------|--------------|----|---------------|--------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|------------------------|--------------------------------------|--------------------------------------|--------------------------|------------------------|-------------------------------------------|--------------------------------------|------------------------|-----------|
|             |              |    |               | A<br>(In <sup>2</sup> )  | I <sub>x</sub><br>(In <sup>4</sup> ) | S <sub>x</sub><br>(In <sup>3</sup> ) | R <sub>x</sub><br>(In) | I <sub>y</sub><br>(In <sup>4</sup> ) | S <sub>y</sub><br>(In <sup>3</sup> ) | R <sub>y</sub><br>(In) | I <sub>x</sub><br>(In <sup>4</sup> ) | S <sub>x</sub><br>(In <sup>3</sup> ) | M <sub>x</sub><br>(In-k) | X <sub>o</sub><br>(In) | J <sub>x</sub> 1000<br>(In <sup>4</sup> ) | C <sub>w</sub><br>(In <sup>6</sup> ) | R <sub>o</sub><br>(In) | R<br>BETA |
| 2 1/2       | TD           | 20 | 0.591         | 0.171                    | 0.181                                | 0.141                                | 1.028                  | 0.027                                | 0.029                                | 0.398                  | 0.155                                | 0.110                                | 1.935                    | -0.775                 | 0.068                                     | 0.031                                | 1.347                  | 0.669     |
|             |              | 18 | 0.766         | 0.222                    | 0.235                                | 0.182                                | 1.030                  | 0.035                                | 0.038                                | 0.396                  | 0.217                                | 0.159                                | 2.798                    | -0.774                 | 0.151                                     | 0.040                                | 1.347                  | 0.670     |
|             |              | 16 | 0.958         | 0.278                    | 0.296                                | 0.226                                | 1.032                  | 0.043                                | 0.047                                | 0.394                  | 0.288                                | 0.217                                | 3.840                    | -0.772                 | 0.296                                     | 0.050                                | 1.348                  | 0.672     |
|             |              | 14 | 1.201         | 0.348                    | 0.372                                | 0.282                                | 1.035                  | 0.053                                | 0.058                                | 0.391                  | 0.372                                | 0.282                                | 5.265                    | -0.770                 | 0.589                                     | 0.063                                | 1.348                  | 0.674     |
| 3 1/2       | TD           | 20 | 0.709         | 0.206                    | 0.387                                | 0.217                                | 1.373                  | 0.030                                | 0.030                                | 0.380                  | 0.337                                | 0.175                                | 3.145                    | -0.680                 | 0.082                                     | 0.066                                | 1.578                  | 0.814     |
|             |              | 18 | 0.923         | 0.267                    | 0.504                                | 0.201                                | 1.374                  | 0.038                                | 0.039                                | 0.379                  | 0.467                                | 0.250                                | 4.472                    | -0.678                 | 0.181                                     | 0.086                                | 1.578                  | 0.815     |
|             |              | 16 | 1.154         | 0.334                    | 0.632                                | 0.350                                | 1.375                  | 0.047                                | 0.049                                | 0.377                  | 0.617                                | 0.337                                | 6.056                    | -0.676                 | 0.357                                     | 0.108                                | 1.578                  | 0.816     |
|             |              | 14 | 1.447         | 0.419                    | 0.794                                | 0.436                                | 1.377                  | 0.059                                | 0.061                                | 0.374                  | 0.794                                | 0.436                                | 8.206                    | -0.673                 | 0.710                                     | 0.135                                | 1.578                  | 0.818     |
| 3 5/8       | TD           | 20 | 0.725         | 0.210                    | 0.420                                | 0.227                                | 1.415                  | 0.030                                | 0.031                                | 0.378                  | 0.366                                | 0.184                                | 3.313                    | -0.670                 | 0.084                                     | 0.072                                | 1.610                  | 0.827     |
|             |              | 18 | 0.942         | 0.273                    | 0.547                                | 0.294                                | 1.416                  | 0.039                                | 0.040                                | 0.376                  | 0.507                                | 0.262                                | 4.702                    | -0.668                 | 0.185                                     | 0.094                                | 1.610                  | 0.828     |
|             |              | 16 | 1.178         | 0.341                    | 0.685                                | 0.366                                | 1.417                  | 0.048                                | 0.049                                | 0.374                  | 0.669                                | 0.353                                | 6.360                    | -0.666                 | 0.364                                     | 0.117                                | 1.610                  | 0.829     |
|             |              | 14 | 1.478         | 0.428                    | 0.861                                | 0.457                                | 1.418                  | 0.059                                | 0.061                                | 0.372                  | 0.861                                | 0.457                                | 8.606                    | -0.663                 | 0.725                                     | 0.146                                | 1.609                  | 0.830     |
| 4           | TD           | 20 | 0.769         | 0.223                    | 0.528                                | 0.260                                | 1.539                  | 0.031                                | 0.031                                | 0.372                  | 0.462                                | 0.212                                | 3.839                    | -0.654                 | 0.089                                     | 0.091                                | 1.708                  | 0.859     |
|             |              | 18 | 1.001         | 0.290                    | 0.687                                | 0.336                                | 1.540                  | 0.040                                | 0.040                                | 0.370                  | 0.638                                | 0.300                                | 5.423                    | -0.639                 | 0.196                                     | 0.117                                | 1.708                  | 0.860     |
|             |              | 16 | 1.251         | 0.362                    | 0.861                                | 0.419                                | 1.541                  | 0.049                                | 0.050                                | 0.368                  | 0.840                                | 0.403                                | 7.306                    | -0.637                 | 0.387                                     | 0.146                                | 1.708                  | 0.861     |
|             |              | 14 | 1.570         | 0.455                    | 1.082                                | 0.552                                | 1.542                  | 0.061                                | 0.062                                | 0.365                  | 1.082                                | 0.522                                | 9.853                    | -0.635                 | 0.771                                     | 0.183                                | 1.707                  | 0.862     |
| 5 1/2       | TD           | 20 | 0.949         | 0.275                    | 1.126                                | 0.404                                | 2.025                  | 0.033                                | 0.032                                | 0.347                  | 1.007                                | 0.342                                | 5.971                    | -0.549                 | 0.110                                     | 0.189                                | 2.126                  | 0.933     |
|             |              | 18 | 1.234         | 0.357                    | 1.465                                | 0.524                                | 2.025                  | 0.043                                | 0.041                                | 0.346                  | 1.374                                | 0.476                                | 8.730                    | -0.547                 | 0.242                                     | 0.245                                | 2.126                  | 0.934     |
|             |              | 16 | 1.545         | 0.447                    | 1.834                                | 0.653                                | 2.025                  | 0.053                                | 0.051                                | 0.344                  | 1.794                                | 0.632                                | 11.622                   | -0.545                 | 0.478                                     | 0.305                                | 2.125                  | 0.934     |
|             |              | 14 | 1.940         | 0.562                    | 2.302                                | 0.816                                | 2.025                  | 0.065                                | 0.064                                | 0.341                  | 2.302                                | 0.816                                | 15.504                   | -0.542                 | 0.952                                     | 0.380                                | 2.123                  | 0.935     |
| 6           | TD           | 20 | 1.009         | 0.292                    | 1.391                                | 0.459                                | 2.183                  | 0.034                                | 0.032                                | 0.340                  | 1.250                                | 0.395                                | 6.426                    | -0.524                 | 0.117                                     | 0.231                                | 2.270                  | 0.947     |
|             |              | 18 | 1.312         | 0.380                    | 1.810                                | 0.594                                | 2.183                  | 0.043                                | 0.041                                | 0.338                  | 1.699                                | 0.541                                | 9.983                    | -0.522                 | 0.258                                     | 0.299                                | 2.269                  | 0.947     |
|             |              | 16 | 1.642         | 0.476                    | 2.265                                | 0.741                                | 2.182                  | 0.054                                | 0.052                                | 0.336                  | 2.215                                | 0.716                                | 13.248                   | -0.520                 | 0.508                                     | 0.372                                | 2.268                  | 0.947     |
|             |              | 14 | 2.063         | 0.597                    | 2.844                                | 0.926                                | 2.182                  | 0.067                                | 0.064                                | 0.334                  | 2.844                                | 0.926                                | 17.624                   | -0.517                 | 1.012                                     | 0.463                                | 2.267                  | 0.948     |
| 7 1/4       | TD           | 20 | 1.158         | 0.335                    | 2.219                                | 0.606                                | 2.572                  | 0.035                                | 0.032                                | 0.323                  | 2.047                                | 0.539                                | 7.596                    | -0.471                 | 0.134                                     | 0.357                                | 2.635                  | 0.968     |
|             |              | 18 | 1.507         | 0.436                    | 2.885                                | 0.786                                | 2.572                  | 0.045                                | 0.042                                | 0.321                  | 2.725                                | 0.722                                | 13.425                   | -0.469                 | 0.296                                     | 0.461                                | 2.634                  | 0.968     |
|             |              | 16 | 1.887         | 0.546                    | 3.611                                | 0.981                                | 2.571                  | 0.056                                | 0.052                                | 0.319                  | 3.538                                | 0.952                                | 17.724                   | -0.467                 | 0.503                                     | 0.573                                | 2.633                  | 0.969     |
|             |              | 14 | 2.371         | 0.686                    | 4.534                                | 1.227                                | 2.570                  | 0.069                                | 0.065                                | 0.317                  | 4.534                                | 1.227                                | 23.436                   | -0.464                 | 1.163                                     | 0.714                                | 2.631                  | 0.969     |
| 8           | TD           | 20 | 1.247         | 0.361                    | 2.839                                | 0.704                                | 2.803                  | 0.036                                | 0.033                                | 0.314                  | 2.642                                | 0.634                                | 8.320                    | -0.445                 | 0.144                                     | 0.447                                | 2.856                  | 0.976     |
|             |              | 18 | 1.624         | 0.470                    | 3.692                                | 0.913                                | 2.802                  | 0.046                                | 0.042                                | 0.312                  | 3.516                                | 0.850                                | 14.487                   | -0.443                 | 0.319                                     | 0.577                                | 2.854                  | 0.976     |
|             |              | 16 | 2.034         | 0.589                    | 4.621                                | 1.139                                | 2.801                  | 0.057                                | 0.053                                | 0.310                  | 4.532                                | 1.107                                | 20.690                   | -0.440                 | 0.629                                     | 0.718                                | 2.853                  | 0.976     |
|             |              | 14 | 2.556         | 0.740                    | 5.801                                | 1.425                                | 2.800                  | 0.070                                | 0.065                                | 0.308                  | 5.801                                | 1.425                                | 27.277                   | -0.438                 | 1.254                                     | 0.893                                | 2.851                  | 0.976     |
| 9 1/4       | TD           | 20 | 1.363         | 0.402                    | 3.254                                | 0.801                                | 3.000                  | 0.036                                | 0.033                                | 0.303                  | 3.254                                | 0.701                                | 9.520                    | -0.430                 | 0.163                                     | 0.487                                | 3.083                  | 0.984     |
|             |              | 18 | 1.818         | 0.526                    | 4.334                                | 1.142                                | 3.183                  | 0.047                                | 0.043                                | 0.298                  | 4.334                                | 0.922                                | 13.325                   | -0.424                 | 0.357                                     | 0.603                                | 3.083                  | 0.984     |
|             |              | 16 | 2.278         | 0.660                    | 5.676                                | 1.426                                | 3.182                  | 0.058                                | 0.053                                | 0.296                  | 5.676                                | 1.209                                | 18.101                   | -0.402                 | 0.704                                     | 0.998                                | 3.221                  | 0.984     |
|             |              | 14 | 2.863         | 0.829                    | 7.382                                | 1.785                                | 3.180                  | 0.072                                | 0.066                                | 0.294                  | 7.382                                | 1.785                                | 24.265                   | -0.400                 | 1.405                                     | 1.241                                | 3.218                  | 0.985     |
| 10          | TD           | 20 | 1.474         | 0.440                    | 3.724                                | 0.909                                | 3.379                  | 0.036                                | 0.033                                | 0.289                  | 3.724                                | 0.771                                | 10.523                   | -0.392                 | 0.172                                     | 0.517                                | 3.217                  | 0.985     |
|             |              | 18 | 1.936         | 0.560                    | 4.914                                | 1.291                                | 3.410                  | 0.047                                | 0.043                                | 0.291                  | 4.914                                | 1.000                                | 14.477                   | -0.385                 | 0.380                                     | 0.958                                | 3.444                  | 0.988     |
|             |              | 16 | 2.425         | 0.702                    | 6.354                                | 1.613                                | 3.408                  | 0.059                                | 0.053                                | 0.289                  | 6.354                                | 1.278                                | 20.356                   | -0.382                 | 0.750                                     | 1.190                                | 3.442                  | 0.988     |
|             |              | 14 | 3.048         | 0.883                    | 8.237                                | 2.019                                | 3.406                  | 0.073                                | 0.066                                | 0.287                  | 8.237                                | 2.019                                | 28.811                   | -0.380                 | 1.495                                     | 1.479                                | 3.439                  | 0.988     |
| 11 1/2      | TD           | 20 | 1.593         | 0.483                    | 4.284                                | 1.019                                | 3.607                  | 0.036                                | 0.033                                | 0.278                  | 4.284                                | 0.841                                | 11.560                   | -0.367                 | 0.180                                     | 0.545                                | 3.438                  | 0.989     |
|             |              | 18 | 2.169         | 0.628                    | 5.956                                | 1.614                                | 3.660                  | 0.048                                | 0.043                                | 0.277                  | 5.956                                | 1.103                                | 16.851                   | -0.350                 | 0.426                                     | 1.312                                | 3.886                  | 0.992     |
|             |              | 16 | 2.718         | 0.787                    | 7.713                                | 2.017                                | 3.858                  | 0.060                                | 0.054                                | 0.275                  | 7.713                                | 1.425                                | 23.557                   | -0.348                 | 0.840                                     | 1.629                                | 3.884                  | 0.992     |
|             |              | 14 | 3.418         | 0.989                    | 10.708                               | 2.527                                | 3.855                  | 0.074                                | 0.067                                | 0.273                  | 10.708                               | 2.527                                | 33.695                   | -0.346                 | 1.677                                     | 2.024                                | 3.881                  | 0.992     |
| 12          | TD           | 20 | 1.718         | 0.523                    | 4.824                                | 1.139                                | 3.855                  | 0.036                                | 0.033                                | 0.269                  | 4.824                                | 0.911                                | 12.628                   | -0.339                 | 0.180                                     | 0.578                                | 3.878                  | 0.992     |
|             |              | 18 | 2.316         | 0.685                    | 6.601                                | 1.611                                | 4.007                  | 0.050                                | 0.044                                | 0.271                  | 6.601                                | 1.184                                | 18.683                   | -0.336                 | 0.426                                     | 1.312                                | 4.028                  | 0.993     |
|             |              | 16 | 2.940         | 0.865                    | 8.633                                | 2.017                                | 4.003                  | 0.062                                | 0.056                                | 0.269                  | 8.633                                | 1.487                                | 25.224                   | -0.329                 | 0.903                                     | 1.629                                | 4.025                  | 0.993     |
|             |              | 14 | 3.612         | 1.071                    | 11.184                               | 2.527                                | 4.004                  | 0.076                                | 0.069                                | 0.267                  | 11.184                               | 2.527                                | 34.713                   | -0.324                 | 1.917                                     | 2.024                                | 4.025                  | 0.994     |
| 13 1/2      | TD           | 20 | 1.849         | 0.568                    | 5.401                                | 1.263                                | 4.153                  | 0.036                                | 0.033                                | 0.260                  | 5.401                                | 0.981                                | 13.839                   | -0.311                 | 0.180                                     | 0.611                                | 4.025                  | 0.995     |
|             |              | 18 | 2.501         | 0.740                    | 7.433                                | 1.611                                | 4.450                  | 0.050                                | 0.044                                | 0.258                  | 7.433                                | 1.263                                | 20.428                   | -0.309                 | 0.426                                     | 1.312                                | 4.468                  | 0.995     |
|             |              | 16 | 3.199         | 0.900                    | 9.781                                | 2.017                                | 4.450                  | 0.062                                | 0.056                                | 0.257                  | 9.781                                | 1.584                                | 28.531                   | -0.303                 | 0.903                                     | 1.629                                | 4.466                  | 0.995     |
|             |              | 14 | 3.910         | 1.132                    | 12.420                               | 2.527                                | 4.450                  | 0.076                                | 0.069                                | 0.254                  | 12.420                               | 2.527                                | 39.102                   | -0.301                 | 1.979                                     | 2.024                                | 4.461                  | 0.996     |
| 14          | TD           | 20 | 1.984         | 0.608                    | 6.001                                | 1.393                                | 4.450                  | 0.036                                | 0.033                                | 0.250                  | 6.001                                | 1.051                                | 15.126                   | -0.295                 | 0.180                                     | 0.644                                | 4.612                  | 0.996     |
|             |              | 18 | 2.743         | 0.800                    | 8.241                                | 1.741                                | 4.596                  | 0.050                                | 0.044                                | 0.250                  | 8.241                                | 1.341                                | 22.261                   | -0.295                 | 0.426                                     | 1.312                                | 4.612                  | 0.996     |

\* Contact DALE/INCOR for Availability

## V-Bar Bracing (VBB)



NOTE: For screw attached assemblies, use (1) No. 10 TEK screw in lieu of welds shown.

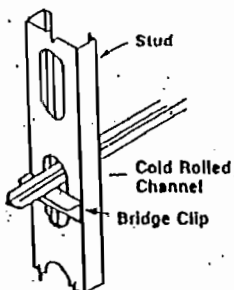
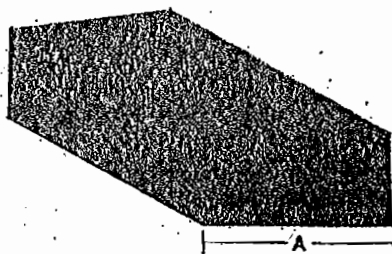
## Uses

- Integral component of stud or joist bridging methods.
- Impedes rotation of C-sections subjected to lateral and/or axial forces.
- Stiffened V section eases installation compared to flat strapping.

## Product Data

- Designations: VB Gage x Spacing.
- Gages: 18 or 16 gage, galvanized.
- Spacing: 16 or 24 inch on center.
- Length: 12'2"

## Cold-Rolled Channel (CRC)



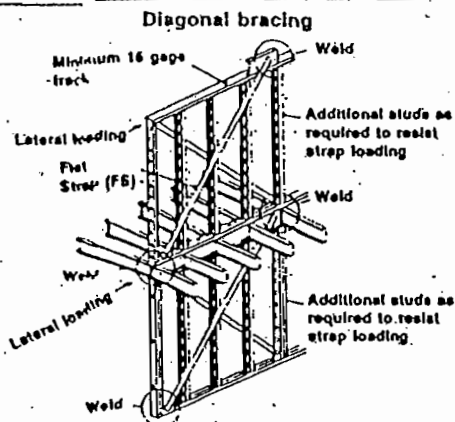
## Uses

- Bridging (lateral support) in walls carrying axial and/or wind loads.
- Bracing studs at door bucks and furring for ceilings.
- Used in conjunction with metal lath and plaster in partitions, ceilings, column and beam enclosures, etc.

## Product Data

- Available in galvanized meeting ASTM A-653.
- Conforms to ASTM performance requirements.
- Lengths: 16' standard (other sizes available)

## Flat Strapping (FS)



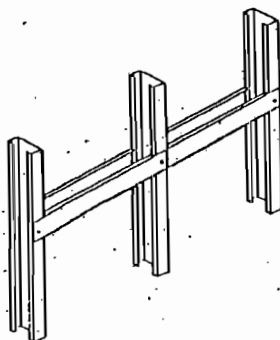
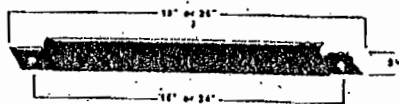
## Uses

- Provides tension force resistance in shear wall assemblies.
- Resists racking of pre-fabricated wall assemblies while handling, transporting and erecting.

## Product Data

- Designation: FS Width x Gage.
- Widths: 2, 3, 4, 5 and 6" (custom widths available upon request).
- Gages: 20, 18, 16, 14 and 12 gage (other gages available).
- Length: standard 10' length (other lengths and coil available).

## Residential Blocking (KATS)



## Uses

- Integral component of stud or joist bridging methods.
- Impedes rotation of C-sections subjected to lateral and/or axial forces.
- Stiffening section eases installation compared to flat strapping.
- Reinforced flat surface allows for ease in attachment of cabinets and hand rails.

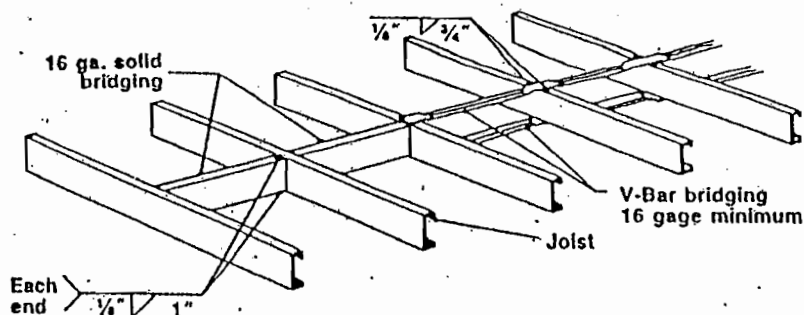
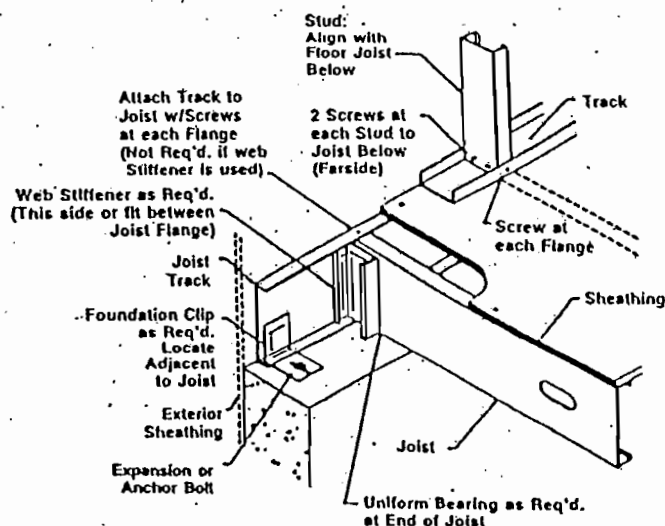
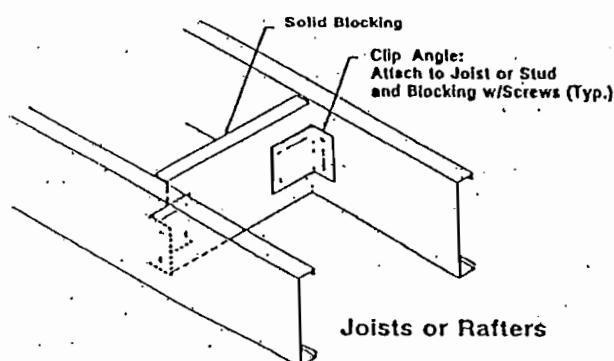
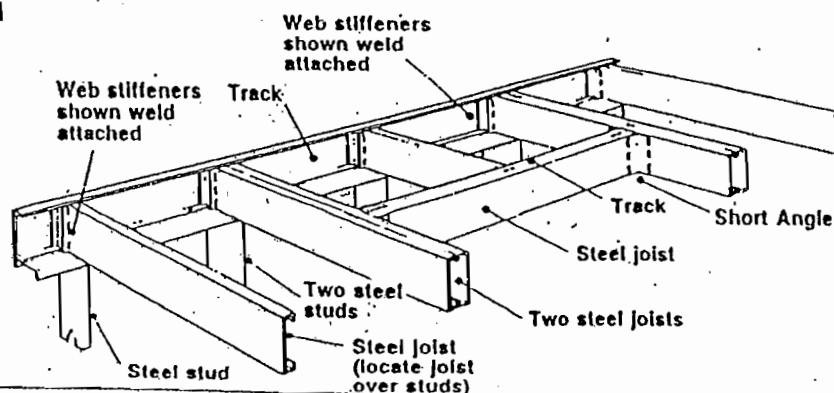
## Product Data

- Designations: KAT x Spacing.
- Gages: 20GA or 25GA galvanized.
- Length: 18" or 26"

**Notes: Joist Bridging**

1. Install mechanical bridging spaced at the following intervals:
  - a. 5'-0" on center maximum for any  $1\frac{1}{2}$ " flanged components or less.
  - b. 7'-0" on center maximum for all remaining member types
2. Proper attachment of diaphragm rated products, such as plywood or metal deck, will prevent rotation of the compression flange of the joists. These may be used in lieu of the installation of the top flat strap. Installation of these products and the balance of the mechanical bridging components must be completed before any loads are applied to the joists.
3. Install 16 gage solid bridging in first two and last two joist spaces. Starting at third joist space, install V-bar bridging, top and bottom, extending for 10'-0" run. Follow with solid bridging in one space. Repeat to completion, with each 10'-0" run of strap bridging followed by one space of solid bridging. (Based on calculations, additional rows of bridging may be required.)

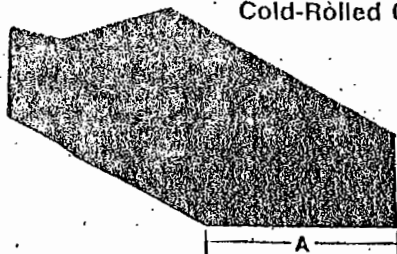
Note: Solid bridging shall not be less than 2" maximum reduction to section depth.

**Construction Detail****Construction Detail**



# "DWC" and "CRC" Tables

## Cold-Rolled Channel (CRC)



| Product # | (A) IN. Size | GA. |
|-----------|--------------|-----|
| CRC-075   | .75          | 16  |
| CRC-150   | 1.50         | 16  |
| CRC-200   | 2.00         | 16  |
| CRC-250   | 2.50         | 16  |
| CRC-250   | 2.50         | 18  |

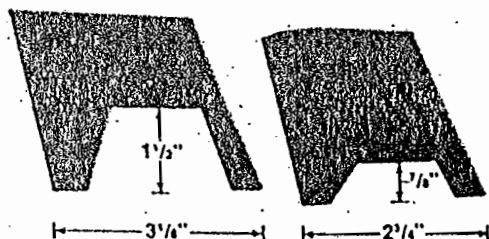
### Uses

- Bridging (lateral support) in walls carrying axial and/or wind loads.
- Bracing studs at door bucks and furring for ceilings.
- Used in conjunction with metal lath and plaster in partitions, ceilings, column and beam enclosures, etc.

### Product Data

- Available in galvanized meeting ASTM A-568 or Hot Dipped galvanized meeting ASTM A-653, G-60. Conforms to ASTM performance requirements.
- Lengths: 16' standard (other sizes available)

## Drywall Furring Channel (DWC)



### Uses

- Convenient accessory components for use in furring out ceilings and masonry walls. Knurled face prevents screw "ride" when attaching gypsum wallboard.
- 1 1/2" DWC is economical with respect to furring walls with electrical boxes (no need to set into concrete).

### Product Data

- Available in 7/8" and 1 1/2" sizes.
- Gage: Standard 25 gage, also available in 22, 20, 18, and 16 gage.
- Lengths: Standard stock 12' (other lengths upon request).

## Physical Structural Properties

| SECTION | WEB (in) | GA | WT (lb/ft) | SECTION PROPERTIES   |                                   |                     |                                   |                     | EFFECTIVE PROP.                   |                                   |                       |
|---------|----------|----|------------|----------------------|-----------------------------------|---------------------|-----------------------------------|---------------------|-----------------------------------|-----------------------------------|-----------------------|
|         |          |    |            | A (in <sup>2</sup> ) | I <sub>x</sub> (in <sup>4</sup> ) | R <sub>x</sub> (in) | I <sub>y</sub> (in <sup>4</sup> ) | R <sub>y</sub> (in) | I <sub>x</sub> (in <sup>4</sup> ) | S <sub>x</sub> (in <sup>3</sup> ) | M <sub>x</sub> (in-k) |
| CRC     | 3/4      | 16 | 0.297      | 0.087                | 0.007                             | 0.289               | 0.002                             | 0.156               | 0.007                             | 0.019                             | 0.457                 |
|         | 1 1/2    | 16 | 0.441      | 0.130                | 0.039                             | 0.548               | 0.003                             | 0.145               | 0.039                             | 0.052                             | 1.228                 |
|         | 2        | 16 | 0.537      | 0.158                | 0.080                             | 0.710               | 0.003                             | 0.137               | 0.080                             | 0.080                             | 1.881                 |
|         | 2 1/2    | 18 | 0.511      | 0.150                | 0.115                             | 0.875               | 0.003                             | 0.131               | 0.115                             | 0.092                             | 2.107                 |
|         | 2 1/2    | 16 | 0.634      | 0.186                | 0.140                             | 0.867               | 0.003                             | 0.129               | 0.140                             | 0.112                             | 2.646                 |
| DWC     | 7/8      | 25 | 0.283      | 0.083                | 0.010                             | 0.361               | 0.057                             | 0.827               | 0.011                             | 0.026                             | 0.506                 |
|         |          | 20 | 0.493      | 0.145                | 0.018                             | 0.347               | 0.090                             | 0.786               | 0.018                             | 0.044                             | 0.863                 |
|         |          | 18 | 0.645      | 0.190                | 0.022                             | 0.341               | 0.117                             | 0.785               | 0.022                             | 0.055                             | 1.084                 |
|         |          | 16 | 0.811      | 0.238                | 0.027                             | 0.334               | 0.147                             | 0.784               | 0.027                             | 0.066                             | 1.305                 |
|         |          | 16 | 1.039      | 0.306                | 0.100                             | 0.571               | 0.245                             | 0.895               | 0.100                             | 0.142                             | 2.809                 |
|         | 1 1/2    | 25 | 0.348      | 0.102                | 0.032                             | 0.584               | 0.082                             | 0.893               | 0.035                             | 0.050                             | 0.986                 |
|         |          | 20 | 0.638      | 0.188                | 0.063                             | 0.578               | 0.150                             | 0.894               | 0.063                             | 0.090                             | 1.774                 |
|         |          | 18 | 0.830      | 0.244                | 0.081                             | 0.575               | 0.195                             | 0.894               | 0.081                             | 0.115                             | 2.277                 |
|         |          | 16 | 1.039      | 0.306                | 0.100                             | 0.571               | 0.245                             | 0.895               | 0.100                             | 0.142                             | 2.809                 |
|         |          | 16 | 1.039      | 0.306                | 0.100                             | 0.571               | 0.245                             | 0.895               | 0.100                             | 0.142                             | 2.809                 |

## Span Table - Pounds Per Lineal Foot Allowable Uniform Loads

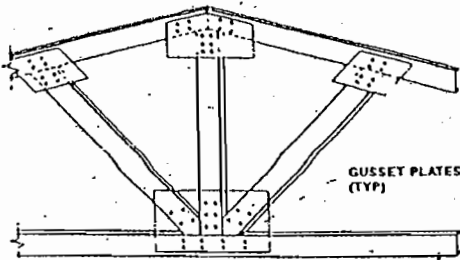
| SECTION | SIZE (in) | GA | 2'    | 3'    | 4'    | 5'   | 6'   | 7'   | 8'   | 9'   | 10'  | 11'  | 12'  |
|---------|-----------|----|-------|-------|-------|------|------|------|------|------|------|------|------|
| CRC     | 3/4       | 16 | 76    | 33    | 19    | 12   | 8    | 6    | 4    | 3    | 3    | 0    | 0    |
|         | 1 1/2     | 16 | 204   | 90    | 51    | 32   | 22   | 16   | 12   | 10   | 8    | 6    | 5    |
|         | 2         | 16 | 313   | 139   | 78    | 50   | 34   | 25   | 19   | 15   | 12   | 10   | 8    |
|         | 2 1/2     | 18 | 351   | 156   | 87    | 56   | 39   | 28   | 21   | 17   | 14   | 11   | 9    |
|         | 2 1/2     | 16 | 441   | 196   | 110   | 70   | 49   | 36   | 27   | 21   | 17   | 14   | 12   |
| DWC     | 7/8       | 25 | 62.7  | 32.2  | 19.7  | 13.2 | 9.5  | 7.2  | 5.6  | 4.5  | 3.1  | 3.1  | 2.6  |
|         |           | 20 | 140.2 | 69.4  | 41.4  | 27.5 | 19.6 | 14.6 | 11.4 | 9.1  | 7.4  | 6.2  | 5.2  |
|         |           | 18 | 190.2 | 92.4  | 54.5  | 35.9 | 25.5 | 19.0 | 14.7 | 12.2 | 10.1 | 8.7  | 6.7  |
|         |           | 16 | 243.3 | 116.4 | 68.1  | 44.6 | 31.5 | 23.4 | 18.1 | 16.4 | 12.7 | 9.1  | 7.6  |
|         |           | 16 | 243.3 | 116.4 | 68.1  | 44.6 | 31.5 | 23.4 | 18.1 | 16.4 | 12.7 | 9.1  | 7.6  |
|         | 1 1/2     | 25 | 82.9  | 45.5  | 29.0  | 20.2 | 14.9 | 11.4 | 9.1  | 7.7  | 6.4  | 5.4  | 4.6  |
|         |           | 20 | 217.4 | 115.6 | 72.2  | 49.4 | 36.0 | 27.4 | 21.6 | 18.3 | 15.5 | 13.0 | 11.1 |
|         |           | 18 | 312.9 | 162.5 | 99.8  | 67.6 | 48.9 | 37.0 | 29.0 | 26.5 | 21.6 | 18.0 | 15.1 |
|         |           | 16 | 422.3 | 214.9 | 130.3 | 87.5 | 62.8 | 47.3 | 36.9 | 27.9 | 22.9 | 19.2 | 16.3 |
|         |           | 16 | 422.3 | 214.9 | 130.3 | 87.5 | 62.8 | 47.3 | 36.9 | 27.9 | 22.9 | 19.2 | 16.3 |

### Foot Notes: 3 Span Half Channel and CRC Tables

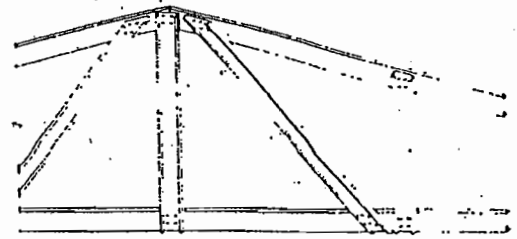
- For use in selection of members subjected to uniform wind loads.
- To determine equivalent pound per square foot (PSF) capacities, divide the pound per lineal foot (PLF) values shown by the joist spacing (i.e. 24" O.C. divide by 2, 16" o.c. divide by 1.333 etc)

### Notes:

1. Applications involving cantilevers, concentrated loads, impact loading, etc. should be investigated separately.
2. Values assume continuous attachment of sheathing material to act as bracing against rotation.

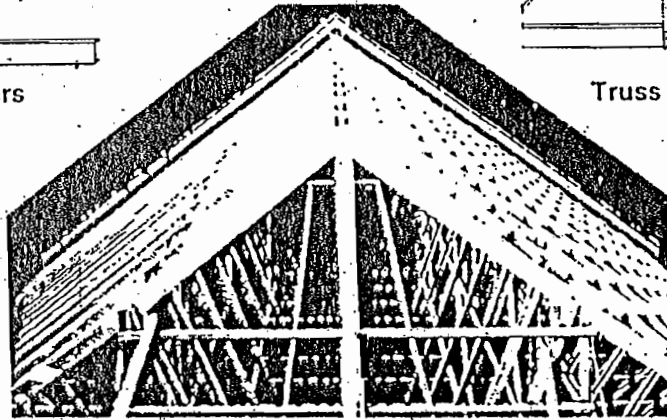


Truss with In-Plane Members



Truss with Out-of-Plane Members

Light-gage steel trusses can be fabricated from DALE/INCOR framing components to provide a fully engineered, non-combustible sloped roof assembly. DALE/INCOR supplies the individual framing components



to the truss fabricator. Should you desire the names of engineering firms and/or fabricators familiar with light-gage truss design and construction in your area, please contact our Technical Services department at our Dearborn, Michigan office.

| WEB   | SECT  | GA | UNBRACED LENGTH (FT) |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |  |  |
|-------|-------|----|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|--|--|
|       |       |    | 1                    | 1.5   | 2     | 2.5   | 3     | 3.5   | 4     | 4.5   | 5     | 5.5   | 6     | 6.5   | 7     | 7.5  | 8    | 8.5  | 9    | 9.5  | 10   | 10.5 | 11   | 11.5 | 12   |  |  |
| 2 1/2 | CN    | 20 | 2.79                 | 2.72  | 2.62  | 2.49  | 2.28  | 2.04  | 1.76  | 1.45  | 1.10  | 1.07  | 0.92  | 0.81  | 0.72  | 0.64 | 0.58 |      |      |      |      |      |      |      |      |  |  |
|       |       | 18 | 4.01                 | 3.87  | 3.68  | 3.45  | 3.17  | 2.85  | 2.52  | 2.07  | 1.74  | 1.49  | 1.30  | 1.16  | 1.05  | 0.95 | 0.87 |      |      |      |      |      |      |      |      |  |  |
|       |       | 16 | 7.29                 | 7.00  | 6.55  | 5.88  | 5.17  | 4.15  | 3.32  | 2.76  | 2.35  | 2.05  | 1.82  | 1.64  | 1.49  | 1.38 | 1.28 |      |      |      |      |      |      |      |      |  |  |
|       |       | 14 | 10.43                | 9.75  | 8.88  | 7.84  | 6.71  | 5.51  | 4.51  | 3.82  | 3.32  | 2.95  | 2.66  | 2.38  | 2.05  | 1.79 | 1.57 |      |      |      |      |      |      |      |      |  |  |
|       | CEE   | 20 | 3.22                 | 3.14  | 3.03  | 2.89  | 2.71  | 2.48  | 2.29  | 1.88  | 1.57  | 1.34  | 1.16  | 1.00  | 0.88  | 0.78 | 0.70 | 0.63 | 0.58 | 0.53 | 0.49 |      |      |      |      |  |  |
|       |       | 18 | 4.59                 | 4.46  | 4.27  | 4.03  | 3.75  | 3.41  | 3.04  | 2.60  | 2.15  | 1.82  | 1.57  | 1.38  | 1.22  | 1.09 | 0.95 | 0.90 | 0.83 | 0.77 | 0.72 |      |      |      |      |  |  |
|       |       | 16 | 8.32                 | 8.05  | 7.66  | 6.98  | 6.17  | 5.21  | 4.12  | 3.36  | 2.61  | 2.41  | 2.10  | 1.86  | 1.67  | 1.51 | 1.38 | 1.27 | 1.18 | 1.10 | 1.04 |      |      |      |      |  |  |
|       |       | 14 | 11.86                | 11.20 | 10.33 | 9.26  | 8.03  | 6.69  | 5.38  | 4.45  | 3.78  | 3.28  | 2.90  | 2.60  | 2.36  | 2.17 | 2.01 | 1.87 | 1.75 | 1.65 | 1.56 |      |      |      |      |  |  |
|       | 3 5/8 | CN | 20                   | 2.67  | 2.64  | 2.77  | 2.60  | 2.58  | 2.41  | 2.52  | 2.09  | 1.77  | 1.52  | 1.34  | 1.18  | 1.06 | 0.96 | 0.88 |      |      |      |      |      |      |      |  |  |
|       |       |    | 18                   | 4.21  | 4.12  | 3.99  | 3.83  | 3.63  | 3.40  | 3.15  | 3.02  | 2.58  | 2.24  | 1.98  | 1.77  | 1.59 | 1.41 | 1.24 |      |      |      |      |      |      |      |  |  |
|       |       |    | 16                   | 7.70  | 7.50  | 7.24  | 6.82  | 6.27  | 5.64  | 4.94  | 4.16  | 3.31  | 3.11  | 2.66  | 2.27  | 1.96 | 1.71 | 1.50 |      |      |      |      |      |      |      |  |  |
|       |       |    | 14                   | 10.64 | 10.28 | 9.79  | 9.19  | 8.49  | 7.70  | 6.80  | 5.65  | 4.58  | 3.78  | 3.18  | 2.71  | 2.34 | 2.03 | 1.79 |      |      |      |      |      |      |      |  |  |
| CEE   |       | 20 | 3.32                 | 3.27  | 3.20  | 3.10  | 2.99  | 2.86  | 2.70  | 2.80  | 2.37  | 2.02  | 1.76  | 1.55  | 1.37  | 1.23 | 1.12 | 1.02 | 0.93 | 0.86 |      |      |      |      |      |  |  |
|       |       | 18 | 4.80                 | 4.71  | 4.59  | 4.44  | 4.25  | 4.03  | 3.79  | 3.96  | 3.36  | 2.89  | 2.53  | 2.23  | 2.00  | 1.80 | 1.64 | 1.50 | 1.37 | 1.26 |      |      |      |      |      |  |  |
|       |       | 16 | 8.74                 | 8.56  | 8.33  | 8.01  | 7.48  | 6.86  | 6.16  | 5.38  | 4.53  | 3.59  | 3.49  | 3.10  | 2.76  | 2.47 | 2.24 | 2.05 | 1.89 | 1.75 |      |      |      |      |      |  |  |
|       |       | 14 | 12.05                | 11.72 | 11.26 | 10.68 | 9.99  | 9.20  | 8.33  | 7.38  | 6.38  | 5.47  | 4.77  | 4.23  | 3.80  | 3.45 | 3.06 | 2.71 | 2.42 | 2.17 |      |      |      |      |      |  |  |
| JW    |       | 20 | 5.44                 | 5.38  | 5.28  | 5.15  | 4.99  | 4.81  | 4.57  | 4.29  | 4.44  | 3.79  | 3.28  | 2.86  | 2.55  | 2.28 | 2.06 | 1.87 | 1.71 | 1.56 | 1.43 | 1.31 | 1.22 | 1.13 | 1.06 |  |  |
|       |       | 18 | 9.34                 | 9.24  | 9.09  | 8.91  | 8.69  | 8.28  | 7.63  | 6.83  | 5.94  | 4.96  | 3.88  | 3.89  | 3.46  | 3.07 | 2.75 | 2.48 | 2.26 | 2.07 | 1.91 | 1.77 | 1.65 | 1.54 | 1.45 |  |  |
|       |       | 16 | 13.57                | 13.34 | 13.04 | 12.56 | 11.86 | 11.05 | 10.14 | 9.12  | 8.01  | 6.82  | 5.91  | 5.16  | 4.57  | 4.08 | 3.69 | 3.36 | 3.09 | 2.86 | 2.66 | 2.48 | 2.33 | 2.20 | 2.08 |  |  |
|       |       | 12 | 21.47                | 21.48 | 21.16 | 20.05 | 18.75 | 17.29 | 15.72 | 14.05 | 12.32 | 10.64 | 9.32  | 8.29  | 7.47  | 6.81 | 6.26 | 5.80 | 5.41 | 5.08 | 4.75 | 4.31 | 3.93 | 3.59 | 3.30 |  |  |
| 4     | CN    | 20 | 2.89                 | 2.86  | 2.79  | 2.72  | 2.62  | 2.47  | 2.29  | 2.23  | 1.89  | 1.63  | 1.42  | 1.26  | 1.13  | 1.02 |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 18 | 4.25                 | 4.16  | 4.04  | 3.89  | 3.71  | 3.50  | 3.26  | 3.22  | 2.75  | 2.38  | 2.06  | 1.80  | 1.59  | 1.41 |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 16 | 7.78                 | 7.60  | 7.35  | 6.98  | 6.47  | 5.87  | 5.20  | 4.36  | 3.66  | 3.11  | 2.69  | 2.34  | 2.02  | 1.76 |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 14 | 10.80                | 10.46 | 10.01 | 9.44  | 8.74  | 7.87  | 6.83  | 5.67  | 4.72  | 3.90  | 3.28  | 2.79  | 2.41  | 2.10 |      |      |      |      |      |      |      |      |      |  |  |
|       | CEE   | 20 | 3.33                 | 3.29  | 3.22  | 3.14  | 3.04  | 2.92  | 2.78  | 2.61  | 2.58  | 2.20  | 1.91  | 1.68  | 1.49  | 1.34 | 1.21 | 1.11 | 1.01 | 0.94 |      |      |      |      |      |  |  |
|       |       | 18 | 4.84                 | 4.76  | 4.65  | 4.51  | 4.34  | 4.14  | 3.92  | 3.66  | 3.66  | 3.15  | 2.75  | 2.43  | 2.17  | 1.96 | 1.78 | 1.64 | 1.51 | 1.40 |      |      |      |      |      |  |  |
|       |       | 16 | 8.82                 | 8.66  | 8.44  | 8.18  | 7.70  | 7.14  | 6.50  | 5.78  | 5.00  | 4.33  | 3.80  | 3.38  | 3.04  | 2.76 | 2.52 | 2.29 | 2.07 | 1.86 |      |      |      |      |      |  |  |
|       |       | 14 | 12.22                | 11.91 | 11.49 | 10.96 | 10.33 | 9.61  | 8.80  | 7.91  | 6.96  | 6.07  | 5.37  | 4.75  | 4.13  | 3.60 | 3.16 | 2.80 | 2.50 | 2.24 |      |      |      |      |      |  |  |
|       | JW    | 20 | 5.48                 | 5.42  | 5.33  | 5.22  | 5.08  | 4.92  | 4.72  | 4.47  | 4.19  | 4.21  | 3.65  | 3.20  | 2.84  | 2.54 | 2.29 | 2.08 | 1.91 | 1.75 | 1.62 | 1.50 | 1.40 | 1.30 | 1.21 |  |  |
|       |       | 18 | 9.41                 | 9.32  | 9.20  | 9.04  | 8.84  | 8.52  | 8.03  | 7.32  | 6.52  | 5.65  | 4.69  | 3.65  | 3.86  | 3.47 | 3.14 | 2.86 | 2.60 | 2.38 | 2.19 | 2.02 | 1.88 | 1.76 | 1.65 |  |  |
|       |       | 16 | 13.73                | 13.53 | 13.26 | 12.87 | 12.25 | 11.53 | 10.71 | 9.80  | 8.80  | 7.71  | 6.74  | 5.95  | 5.25  | 4.69 | 4.23 | 3.84 | 3.52 | 3.25 | 3.01 | 2.81 | 2.64 | 2.48 | 2.35 |  |  |
|       |       | 12 | 21.67                | 21.21 | 20.57 | 19.78 | 18.85 | 17.95 | 17.18 | 15.59 | 13.92 | 12.20 | 10.65 | 9.45  | 8.49  | 7.71 | 7.07 | 6.53 | 6.08 | 5.46 | 4.93 | 4.47 | 4.07 | 3.73 | 3.42 |  |  |
| 6     | CN    | 20 | 2.93                 | 2.90  | 2.84  | 2.76  | 2.66  | 2.50  | 2.31  | 2.20  | 1.85  | 1.56  | 1.38  | 1.21  | 1.07  |      |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 18 | 4.35                 | 4.26  | 4.14  | 3.98  | 3.78  | 3.55  | 3.72  | 3.07  | 2.60  | 2.23  | 1.94  | 1.71  | 1.52  |      |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 16 | 7.99                 | 7.79  | 7.53  | 7.10  | 6.51  | 5.79  | 4.95  | 4.10  | 3.47  | 2.96  | 2.60  | 2.29  | 2.03  |      |      |      |      |      |      |      |      |      |      |  |  |
|       |       | 14 | 11.21                | 10.85 | 10.33 | 9.65  | 8.82  | 7.80  | 6.58  | 5.46  | 4.62  | 3.97  | 3.45  | 3.02  | 2.68  |      |      |      |      |      |      |      |      |      |      |  |  |
|       | CEE   | 20 | 3.39                 | 3.35  | 3.30  | 3.23  | 3.15  | 3.05  | 2.93  | 2.80  | 2.63  | 2.59  | 2.23  | 1.95  | 1.73  | 1.54 | 1.39 | 1.25 | 1.14 |      |      |      |      |      |      |  |  |
|       |       | 18 | 4.95                 | 4.89  | 4.80  | 4.68  | 4.54  | 4.36  | 4.17  | 3.94  | 3.69  | 3.60  | 3.12  | 2.73  | 2.42  | 2.16 | 1.95 | 1.77 | 1.61 |      |      |      |      |      |      |  |  |
|       |       | 16 | 9.05                 | 8.92  | 8.73  | 8.50  | 8.14  | 7.63  | 7.04  | 6.35  | 5.58  | 4.78  | 4.15  | 3.64  | 3.23  | 2.89 | 2.60 | 2.36 | 2.15 |      |      |      |      |      |      |  |  |
|       |       | 14 | 12.69                | 12.43 | 12.06 | 11.58 | 10.99 | 10.29 | 9.46  | 8.51  | 7.42  | 6.36  | 5.52  | 4.85  | 4.29  | 3.83 | 3.44 | 3.11 | 2.83 |      |      |      |      |      |      |  |  |
|       | JW    | 20 | 5.60                 | 5.56  | 5.50  | 5.42  | 5.33  | 5.22  | 5.09  | 4.94  | 4.75  | 4.54  | 4.30  | 4.44  | 3.94  | 3.52 | 3.18 | 2.89 | 2.64 | 2.43 | 2.24 | 2.08 | 1.94 | 1.81 |      |  |  |
|       |       | 18 | 9.64                 | 9.58  | 9.50  | 9.39  | 9.25  | 9.09  | 8.88  | 8.54  | 8.03  | 7.42  | 6.75  | 6.02  | 5.36  | 4.81 | 4.36 | 3.98 | 3.62 | 3.31 | 3.04 | 2.80 | 2.60 | 2.40 | 2.20 |  |  |
|       |       | 16 | 14.21                | 14.07 | 13.88 | 13.65 | 13.32 | 12.82 | 12.24 | 11.58 | 10.86 | 10.06 | 9.22  | 8.26  | 7.30  | 6.51 | 5.85 | 5.28 | 4.80 | 4.39 | 4.02 | 3.68 | 3.34 | 3.04 | 2.75 |  |  |
|       |       | 12 | 23.09                | 22.77 | 22.33 | 21.78 | 21.11 | 20.33 | 19.44 | 18.37 | 17.16 | 15.81 | 14.29 | 12.62 | 11.13 | 9.90 | 8.82 | 7.82 | 6.97 | 6.26 | 5.65 | 5.12 | 4.67 | 4.27 |      |  |  |

Foot Notes: Unbraced Axial Load Table

1. Allowable axial load in kips (K)
2. Table is for use in selection of members subjected to concentric axial loads, such as truss web members.

3. Values shown assume no mechanical bridging.
4. Values have been omitted where  $L/r$  exceeds 200.
5. Contact DALE / INCOR for allowable axial capacities of unbraced components not shown in the table.

## DALE/INCOR® steel framing

## Suggested Specifications

## Part 1—General

- 1.01 RELATED WORK SPECIFIED ELSEWHERE  
1.02 WORKMANSHIP AND QUALITY ASSURANCE  
1.03 SUBMITTALS

## Part 2—Material

2.02.01 All stud (and/or) joist framing members shall be of the type, size and gage as shown on the plans and shall be manufactured by DALE/INCOR.

2.02.02 Galvanized studs and joists 12, 14, and 16 gage shall be formed from steel that corresponds to ASTM A653. Structural calculations should be prepared utilizing one of the following grades.

|             |                        |    |
|-------------|------------------------|----|
| SQ Grade 33 | minimum yield strength | 33 |
| SQ Grade 40 | minimum yield strength | 40 |
| SQ Grade 50 | minimum yield strength | 50 |

2.02.03 All galvanized 18 and 20 gage studs (and/or) joists, and all galvanized track, bridging, and closures and accessories shall be formed from steel that corresponds to the requirements of ASTM A653, SQ Grade 33, with a minimum yield of 33,000 psi.

2.02.04 DALE/INCOR It is suggested that all studs, joists and accessories should be formed from steel having a G-60 galvanized coating or equivalent, meeting ASTM A653 and C955.

2.02.05 The physical and structural properties listed by DALE/INCOR shall be considered the minimum permitted for all framing members. Specifically, the following minimum properties, calculated in accordance with the latest A.I.S.I. Specification, shall be provided as indicated on page 2.

| Component<br>(Stud, Joist<br>or Accessory) | $I_x$<br>(in. <sup>4</sup> ) | Resisting Moment<br>(in.-k) |
|--------------------------------------------|------------------------------|-----------------------------|
|--------------------------------------------|------------------------------|-----------------------------|

## 2.03 FABRICATION

2.03.01 Prior to prefabrication of framing, the contractor shall submit fabrication and erection drawings to the architect or engineer to obtain approval.

2.03.02 Framing components may be pre-assembled into panels prior to erecting. Prefabricated panels shall be square with components attached in a manner as to prevent racking.

2.03.03 All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.

2.03.04 Axially loaded studs shall be installed in a manner which will assure that ends of the studs are positioned in the track with a minimum gap, prior to stud and track attachment.

2.03.05 Provide insulation equal to that specified elsewhere in all double jamb studs and double header members which will not be accessible to the insulation contractor.

## Part 3—Execution

## 3.01 INSPECTION

## 3.02 ERECTION (WIND LOAD ONLY)

3.02.01 Handling and lifting of prefabricated panels shall be done in a manner as to not cause distortion in any member.

3.02.02 Tracks shall be securely anchored to the supporting structure as shown on the plans.

3.02.03 At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt-welded or spliced together.

3.02.04 Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

3.02.05 Jack studs or cripples shall be installed below window sills, above window and door heads, at free standing stair rails; and elsewhere to furnish support, and shall be securely attached to supporting members.

3.02.06 Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the following schedule. Walls up to 10'0" height: one row at mid-height. Wall exceeding 10'0" height: bridging rows spaced not to exceed 5'0" on-center.

3.02.07 Provision for structure vertical movement shall be provided where indicated on the plans using the DALE/INCOR Vertical Slide Clip or other means in accordance with DALE/INCOR Inc. recommendations.

## 3.03 ERECTION (AXIAL LOAD-BEARING)

3.03.01 Handling and lifting of prefabricated frame panels shall be done in a manner as to not cause distortion in any member.

3.03.02 Tracks shall be securely anchored to the supporting structure as shown on the plans.

3.03.03 Complete uniform and level bearing support shall be provided for the bottom track.

3.03.04 At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt welded or spliced together.

3.03.05 Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

3.03.06 Framed wall opening shall include headers and supporting studs as shown on the plans.

3.03.07 Jack studs shall be installed below window sills, above window and door heads, at free standing stair rails, and elsewhere to furnish support, and shall be securely attached to supporting members.

3.03.08 Temporary bracing shall be provided until erection is completed.

3.03.09 Wall stud bridging shall be installed in a manner to provide resistance to both minor axis bending and rotation. Bridging rows shall be equally spaced not to exceed 5'0" on-center for wind loading only, or 4'0" on-center for axial loading.

3.03.10 Provide stud walls at locations indicated on plans as "shear walls" for frame stability and lateral load resistance. Such stud walls shall be braced as indicated on plans and specifications. Additional studs shall be positioned to resist the vertical components as indicated on plans.

3.03.11 Splices in axially loaded studs shall not be permitted.

3.03.12 Provide insulation equal to that specified elsewhere in all doubled header members which will not be accessible to the insulation contractor.

## 3.04 ERECTION (COLD-FORMED STEEL JOISTS)

3.04.01 Joists shall be located directly over bearing studs or a load distribution member shall be provided at the top track.

3.04.02 Provide web stiffeners at reaction points where indicated by plans.

3.04.03 Joists bridging shall be provided as shown on the plans.

3.04.04 Provide an additional joist under parallel partitions when the partition length exceeds one-half the joist span and around all floor and roof openings which interrupt one or more spanning members unless otherwise noted.

3.04.05 End blocking shall be provided where joist ends are not otherwise restrained from rotation.

For additional Specifications contact DALE/INCOR for a comprehensive set.

DALE INDUSTRIES  
Headquarters and  
Plant

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FAX: (313) 846-7128  
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INCOR DIVISION OF  
DALE INDUSTRIES

4601 N. Point Blvd.  
Baltimore, MD 21219  
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DALE/INCOR INDUSTRIES  
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DALE/INCOR  
ALABAMA DIVISION

511 Vulcan Drive, Ste. 109  
Birmingham, AL 35210  
(205) 956-9470  
FAX: (205) 956-9625  
1-800-397-STUD



Members of



**DIVISION 6 CARPENTRY****SECTION 06000. GENERAL**

- A. Provide shop drawings for any pre-assembled stud walls, and all roof trusses specified under this Division shall be submitted to the Architect for review.

**SECTION 06010. LUMBER**

- A. This Section encompasses lumber for all work of this Division.
- B. At the Contractor's option, lumber for various uses may be one of the species or grades for the purposes listed. The lumber supplier is to furnish statements for all lumber moisture contents, to Owner and Architect.

| <u>USE</u>                                          | <u>SPECIES</u>                          | <u>MINIMUM GRADE</u>                                                    |
|-----------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------|
| Framing Lumber and Materials:                       |                                         |                                                                         |
| a. Joist Framing Members:<br>Metal; see light gauge |                                         |                                                                         |
| b. Stud Framing Members<br>Metal, see light gauge   |                                         |                                                                         |
| c. Plates, Blocking,<br>Furring, Bridging           | Douglas Fir<br>Southern Pine<br>Hem Fir | Construction<br>Construction<br>No. 2 (19% maximum<br>moisture content) |

Note: All wood plates, joist ends, ledgers, etc. bearing on, or attached directly in contact with masonry to be chemically treated with preservative to prevent decomposition. In addition, floor joists or trusses and first floor bottom wall plates are to have maximum moisture content of 15%.

- C. Grading of lumber of various species shall be according to the American Lumber Standards, Simplified Practice Recommendation R16.

**D. Moisture content of lumber, unless otherwise indicated or specified, shall be as follows:**

1. One-inch lumber - air or kiln dried to not over 19% moisture content.
2. Dimension lumber - in accordance with Association Rules for grade and moisture content.
3. Exterior and interior finishing lumber - kiln dried with moisture content at time of delivery not greater than 12% for material 1" thick or less and 15% for over 1" thickness.
4. Lumber in contact with and bearing on masonry to have 15% or less moisture content. See wood treatment section of this division also.
5. Moisture content of framing lumber in building is to be field tested by Owner prior to installation of drywall. Moisture content not to exceed 12% prior to drywalling.

**SECTION 06100. ROUGH CARPENTRY**

**A. This section encompasses wood blocking and framing as indicated on the Drawings. Lumber shall be in accordance with Section 06010. Rough Carpentry work shall include but is not limited to the following:**

1. Provide and install proper construction of wood ladder(s), attic walk boards, and draftstop wall access panels as indicated.
  - a. Walk boards:  $\frac{3}{4}$ " x 2'-0" wide A/C grade plywood in locations shown.
  - b. Access doors: Minimum 24" x 36",  $\frac{1}{2}$ " plywood with 1 by 4 wood frames.
    - 1) Spring: Stanley CD1701
    - 2) Hinge: Stanley FBB171
    - 3) Push/pull/latch: Stanley CD1280, aluminum
2. Rough carpenter is to provide all nails, adhesive, fastening devices and/or joist hangers as required for his work.
3. Frame opening in joists for plumbing as detailed.
4. Furnish and install fire extinguisher cabinets every 75'-0" in corridors or as directed by the local fire department. Cabinets to be Larsen Model #2409-6R, key locked, semi-recessed with breakable glass doors, as supplied by General Fire Equipment Co., #(414) 475-0959. The fire extinguishers will be provided by Owner.
5. Provide and install all miscellaneous plates and blocking on roof, as required.

**B. Nails, bolts, nuts expansion bolts, screws, washer and anchors shall be steel and iron of standard type and make. Use galvanized nails for exposed exterior nailing.**

**C. Installation:**

1. Frame, fit loosely and set framing accurately to the required lines and levels; secure rigidly in place. Provide special framing or construction not indicated, not specified, as required to complete work in the best workmanlike manner. Nail, spike and bolt thoroughly using fasteners of ample size.
2. Furnish and install dressed wood plates, blocking and furring where indicated and required. Set rigidly, in alignment. True up with a long straight edge to receive other work as indicated.

3. The Carpenter is to cut every third sheet of plywood subfloor as required to maintain the proper end and side gaps between all sheets of plywood as specified by the manufacturer.

**D. Delivery, Handling, and Storage**

1. Lumber and plywood shall be delivered to job site just prior to its intended use.
2. Store lumber and plywood stacked 4" above grade, cover with waterproof material and protect from damage and weather.
3. Provide secured storage for miscellaneous rough hardware items.
4. Construction of all designed bearing wall blocking, fire stops, smoke partitions, drop headers, replacement of delaminated decking, and construction stairs is the responsibility of this Contractor.

**SECTION 06110. FLOOR DECK AND FRAMING**

**A. Wall and partition framing - unless otherwise shown, space studs 16" o.c.**

1. Double studs at openings (full stud and shoulder stud).
2. Construct partition corners of not less than 3 full members.
3. Any wood plates or tracks resting on concrete shall be anchored with concrete nails or power driven nails @ 32" o.c.

**B. FABRICATION**

1. Prior to prefabrication of framing, the Contractor shall submit fabrication and erection drawings to the Architect or Engineer to obtain approval.
2. Framing components may be preassembled into panels prior to erecting. Prefabricating panels shall be square with components attached in a manner as to prevent racking.
3. All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.
4. Axially loaded studs shall be installed in a manner that will assure that ends of the studs are positioned against the inside track web, prior to stud and track attachment.
5. Provide insulation equal to that specified elsewhere in all double jamb studs and double-header members which will not be accessible to the insulation contractor.

**C. EXECUTION**

1. Inspection
2. Erection
  - a. Handling and lifting of prefabricated panels (if any) shall be done in a manner as to not cause distortion in any member.
  - b. Tracks shall be securely anchored to the supporting structure as shown on the plans.
  - c. At track butt joints, abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt-welded or spliced together.
  - d. Studs shall be plumbed, aligned and securely attached to the flanges or webs of both upper and lower tracks.

- e. Jack studs or cripples shall be installed below windowsills, above window and door heads, at free standing stair rails, and elsewhere to furnish support, and shall be securely attached to supporting members.
- f. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to the following schedule. See plans.
- g. Walls up to 10'-0" height: One row at mid-height.
- h. Walls exceeding 10'-0" height: Bridging rows spaced not to exceed 5'-0" on center.

#### **SECTION 06172. EXTERIOR SHEATHING**

- A. Furnish and install 5/8" Denseglass sheathing as shown on plans per manufacturer's requirements.

#### **SECTION 06200. FINISH CARPENTRY**

- A. This section encompasses the installation of all finish carpentry materials supplied under other sections including millwork, cabinetwork, and paneling.
- B. Furnish labor for all finish carpentry work in accordance with DIVISION 1 of these Specifications.
- C. Lumber shall be in accordance with Section 06220, page 6/9 of these Specifications.
- D. Finish carpentry shall be in accordance with the best of the trade practices
- E. Finish carpentry includes but is not limited to the following work:
  - 1. Installation of all necessary wood or metal jambs and casings as called for on the drawings, including crown molding as shown on the plans
  - 2. Installation of pegboard and workbench in Storage Room, closets and workroom as shown on plans. Install Owner supplied melamine spur shelving (with pine edges as shown on drawings) and standards.
  - 3. Install laminated plastic tops: Cup Board, Business Center, Pantry cabinets, Front Desk Lobby area, Great Room, Lobby, and Manager's Office, room vanities, and other miscellaneous tops as shown on the drawings. Laminate general-purpose grade 10 with matte finish, bond to 3/4" plywood having smooth hardwood veneer in accord with manufacturer's recommendation. Pantry, Front Desk, Cup Board, Manager's Office countertops, and bath vanity colors as per Owner's Finishes Schedule. Vanity tops and backsplash to be triple postformed. See drawings for other cabinet/vanity work.
  - 4. Finish hardware installation by this Contractor throughout building.
  - 5. Install closet hardware/millwork in each room. (Assemble as required.)
  - 6. Install shelves and poles for all storage closets as indicated and stain, seal, and varnish per Finish Schedule.
  - 7. Provide and install aluminum screened soffit vents (painted).



8. Install all doors and frames, including hardware. The guest room carpet and pad thickness is 13/16". Entry doors are to be installed accordingly to allow for a free swing with minimum gap. Any necessary cutting of doors is to be the Contractor's responsibility. Carpenter is to verify thickness of carpet prior to setting doorframes!
9. Install plastic laminate sills fabricated by others at windows as shown on plans (postformed style with rolled edge on front). Note: Verify color of all sills with Owner. Provide with ear extensions as per plans.
10. Install all aluminum windows per manufacturer's recommendations. See Section 08610.
11. Install custom cabinets. Office, Front Desk: All vertical sides, rails, doors and draws to be laminated as per Owner's Finish Schedule. Install ball bearing extension drawer sides (Knap & Vogt). Schlage No. 46-001 cabinet lock for all drawers. All cabinets to be screwed to studs with minimum of 2" embedment and glued to wall. All hardware and hinges in front desk area are to be concealed type.
12. Receive, store and be responsible for all finish hardware and/or card entry system. Properly tag, index and file all keys. Apply hardware in accordance with the manufacturer's instructions; fit accurately; apply securely and adjust carefully. Use care not to damage the work when applying hardware.
  - a. See DIVISION 8 for "Keying" information.
13. Install all Toilet Accessories as specified under DIVISION 10.
14. All exterior wood trim to be applied with zinc plated, 1/4" head with a Robertson square drive, 1-5/8" long corrosion resistant screws. Available through Reinhold Bothers Company, 2402 W. Lisbon Ave., Milwaukee, WI 53205-1499, Phone #(414) 344-5230, Fax #(414) 344-5665
15. Caulking of windowsills and vanity tops in matching color to be by installer of sills and tops. (Verify color with Owner)
16. Caulking of window surrounds in clear; air conditioning units to match painted walls, clear on papered walls; vanity sink in white; tub surround and floor line at ceramic tile in white; and water closet in white. Check Owner's Finish Schedule. (Must verify color with Owner)

## **SECTION 06220. MILLWORK**

- A. Lumber shall be in accordance with Section 06010.
- B. Workmanship:
  1. Millwork shall be of the highest grade in the trade. Accurately mill to the indicated details, profiles, and lines; sand smooth, mortise, tenon, spline, house, join, block, nail, screw and bolt together as approved. Avoid swelling and shrinkage; insure work remaining in place without warping, splitting and opening of joints.
  2. Secure work to grounds and otherwise fasten in position to hold correct surfaces, lines and levels. Make finished work flat, plumb and true.
  3. See Section 06200.(E)
- C. Materials:
  1. Dimension and board lumber shall be Douglas Fir or Pine. Maximum allowable moisture content shall be 12%.
    - a. Appearance framing (2" to 4" thick, 2" and wider) shall be Douglas Fir, S4S, No. 1 Appearance.



- b. Boards (1" thick, 2" and wider) shall be Douglas Fir or Pine, S4S, Superior or better.
- 2. Exterior millwork, if required. Select from "C and better" clear heart redwood (CRA) to yield soundest practical material.
- 3. Interior millwork not otherwise noted below. Select from required grade of Ponderosa Pine (WWPA) or Northern White Pine (NLMA) and plywood (APA) to yield AWI "Custom" grade woodwork. Casing trim shall be without joints. Running trim shall be in lengths as long as practical. Finger joint material is not acceptable.
  - a. Shelving shall be 3/4" plywood APA INT. B-B with solid edge strip. Support a 3'-0" o.c. maximum (6" x 6" shelf brackets at 4'-0" o.c.)
  - b. Melamine surfaced for cabinet interiors and other designated areas: ANSI A208-2 1994; formaldehyde free binders with NEMA Standard LD-3.1-1991, Type Designation GP-20 melamine surfacing both faces, Medium Density fiberboard (MDF) weighing 44 PCF, minimum.
  - c. Standing and running trim shall be non-stock, profiles as indicated on drawings.
- 4. Base for all plastic laminate to be 3/4" plywood. (Interior grade.)
- 5. Miscellaneous hardware, brackets and fasteners shall be commercial quality type, sized for intended use and purpose.
- 6. Supply all necessary accessories such as edge mold, divider mold and cap mold, etc. for a complete job.
  - a. Any additional wood indicated on the Drawings as treated.
- 7. Crown molding chair rail to be stained and finished mahogany in Lobby. See Owner's Finish Schedule for paint and stain selections.

**D. Shop assembly:**

- 1. Comply with applicable requirements of AWI.
- 2. Quality standards for the following types of architectural woodwork; comply with indicated standards as applicable.
  - a. Standing trim, running trim, and rails: AWI Section 300, Custom Grade.
  - b. Architectural cabinets, wood: AWI Sections 400 for Reveal Overlay and 400A; Premium Grade.
  - c. Architectural cabinets, laminate clad: AWI Sections 400 for Flush Overlay and 400AB; Premium Grade.
  - d. Architectural cabinets, tops: AWI Sections 400 for High Pressure Decorative Laminate Tops and 400C; Custom Grade.
  - e. Shelving: AWI 600; Custom Grade with applied edge treatment.
  - f. Miscellaneous ornamental break points for item which cannot be manufactured in one piece; note joints on shop drawings.

**E. Shop finishing:**

- 1. Finish millwork items in accord with finishing requirements of allowable AWI Grade indicated unless otherwise indicated.
- 2. Furnish work smooth, free from abrasion, tool marks, raised grain, and other Grade prohibited defects on exposed surfaces.
- 3. **VERIFY ALL FINISHES WITH OWNER PRIOR TO FABRICATION OF ANY MILLWORK, CABINETS, COUNTERS, ETC.**

**F. Tolerances: Fabricate millwork items to AWI Premium Grade unless otherwise indicated.**

**SECTION 06310. FABRICATION**

- A. Assemble and finish material at the mill as far as feasible. Make accurate and tight joints, miter corners. Joints shall be blocked, glued and nailed. Use screws and bolts as required for strength and rigidity and as indicated on drawings. Fastenings shall be concealed unless otherwise indicated on drawings.
- B. Edges of plywood (i.e., dividers, fronts, etc.) shall be edge banded with 1/2" thick hardwood. Edges shall be glued and nailed. For plastic laminate details, provide "Backer-Sheet" on plywood for counter top details and return laminate finish on vertical face and adjacent bottom edge.

**SECTION 06320. WORKMANSHIP**

- A. Use workmanship and assembly conforming to the requirements for work shown in Section 400 of "Quality Standard of the AWI" unless specified or detailed to the contrary. Work shall be premium grade.

**SECTION 06370. ASSEMBLY AND INSTALLATION**

- A. Glue for joinery shall conform to applicable AWI requirements.
- B. Shop assemble all work with the exception of items too large for entrances into the use area. Make the latter in sections with provisions made for job connection in the space to be used. Scribe contacts with adjoining work as required.
- C. Use concealed fastening wherever possible, where not possible use finish nails or countersunk screws and set heads for puttying. Drill pilot holes for nails in hardwood.
  - 1. Kerf back off all hardwood trim 5" or more wide and more than 1" thick.
  - 2. Ease all exposed edges of hardwood trim.
- D. Supervise and arrange with painter, for sealing, priming or back painting of all wood trim, doors, metal items, etc.
  - 1. All wood or metal concealed from view shall be sealed or back painted prior to installation.
  - 2. Do not prime paint wood to be stained.

**SECTION 06380. PROTECTION**

- A. Installer of Finish Carpentry work shall advise Contractor of final protection and maintain conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

**SECTION 06385. ADJUST AND CLEAN**

- A. This sub-contractor shall leave carpentry and millwork in first class condition, ready for the next corresponding contractor to complete the work.

- B. This sub-contractor shall be responsible for leaving all of the building in a broom clean condition. All separate trades shall be required to remove their own debris.

#### **SECTION 06390. GUARANTEE**

- A. The Contractor shall furnish a guarantee covering this work, for labor and materials, for a period of one (1) year from the date of the building opening, in a form acceptance to the Owner and the Architect.

#### **SECTION 06395. MATERIALS AND APPLICATION**

- A. Wood shall be treated with preservative using a vacuum-pressure process. Treatment shall be "Wolmanized" treatment using Wolman slats by Koppers Company, Inc.; "Osmose" treatment using Osmose K-33 by Osmose Wood Preserving Company of America, or an approved equal.
- B. Treatment and preservatives shall conform to Federal Specification TT-W0571 and American Wood Preserver's Institute Standard LP-2.
- C. Wood shall be dried after treatment to a maximum moisture content of 19%. Each piece shall bear the Grade-Mark of a recognized grading agency or bureau and the AWPI Quality Mark.

#### **SECTION 06625. SOLID SURFACING MATERIALS**

##### **PART 1 – GENERAL**

##### **1.01. SUMMARY**

- A. This section encompasses the following:
  - 1. Countertops with cut-outs for undermount bowls; plumbing brass, faucets, and fittings not included.
  - 2. Backsplashes and endsplashes.
  - 3. Thresholds.
  - 4. Shower/tub surrounds.
  - 5. Shower floors.
  - 6. Products installed but not furnished under this section: Undermount bowl hardware to be cast in to top for installation of undermount bowl furnished and installed in another Section.

##### **1.02 QUALITY ASSURANCE**

- A. Qualifications; fabricator: Product standard of quality manufacturer's approved and certified fabricator with at least three (3) years verifiable experience subsequent to certification and experience criteria will be reviewed.

##### **1.03 WARRANTY**

- A. Special warranty: Manufacturer's standard ten (10) year warranty for defective materials; include material color fastness; include labor and materials at no additional cost.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Acceptable products:

1. Avonite, Inc.; Formstone.
2. E.I. DuPont de Nemours and Company, Inc.; Corian.
3. Wilsonart International Inc.; Gibraltar.
4. Cultured Marble.

#### B. Characteristics:

1. Material: Filled methyl methacrylate sheet.
2. Thickness; slab: ½".
3. Colors: Indicated on Interior Finish Schedule.
4. Flame spread, fuel contribution, and smoke development: ASTM E84-95 and NFPA 101-94, Class A.
  - a. Flame spread: >25.
  - b. Smoke developed: >30.
5. Approvals: NSF Approval.

#### C. Accessory products:

1. Adhesives: ANSI A136.1-1967 neoprene based panel adhesive.
2. Sealant: Manufacturer's recommended type.
3. Joint compound: Color matched, field applied; same manufacturer as slab material.

### 2.02 MANUFACTURED UNITS

#### a. Shower floor:

1. Product standard of quality: ShowerShapes®; Universal Shower Floor.
2. Characteristics:
  - a. Material: E.I. DuPont de Nemours and Company, Inc.; Corian
  - b. Configurations: Indicated on drawings; complete with standard cutouts for plumbing drain; ADA compliant where indicated.
  - c. Furnish product standard quality manufacturer's standard underhung white china bowl.
  - d. Furnish structural steel mounting brackets; sized by manufacturer for top.
  - e. Color: See Owner's Finish Schedule.

#### B. Vanity tops:

1. Product standard of quality: Lodging Solutions; Vanity Top.
2. Characteristics:
  - a. Material: E.I. DuPont de Nemours and Company, Inc.; Corian
  - b. Configurations: Indicated on drawings; complete with standard cutouts for plumbing brass.
  - c. Bowl apron: 7 ½" by ½" thickness by top length with tissue cutout.
  - d. Furnish structural steel mounting brackets; sized by manufacturer for top.
  - e. Color: See Owner's Finish Schedule.

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**C. Shower/tub surrounds:**

1. Product standard of quality: Lodging Solutions; Tub Surrounds, Option four piece system and Option 2, three piece system.
2. Characteristics:
  - a. Material: E.I. DuPont de Nemours and Company, Inc.; Corian
  - b. Panels: ¼" thickness flat panels; widths and heights indicated; complete with trim pieces.
  - c. Flame spread, fuel contribution, and smoke development: ASTM E84-95 and NfiPA 101-94, Class A.
    - 1) Flame spread: >25.
    - 2) Smoke developed: >30.
  - d. Color: See Owner's Finish Schedule.
3. Accessories: Two surface applied soap dishes for each assembly; furnish loose for application at project site.

**2.03 FABRICATION**

**A. Shop assembly:**

1. Employ product standard quality manufacturer's authorized fabricator for solid surfacing material fabrication.
2. Factory cut and fabricate solid surfacing material to greatest extent possible to sizes and shapes indicated on reviewed shop drawings.
3. Lay-up selected colors to indicated configurations for edge treatments; prepare for final contouring.
4. Contour edges to indicated profile.
5. Furnish tops with cutouts for underhung bowls; match bowl profile. Insert undermount bowl mounting hardware into top underside during fabrication process for bowl installation in another Section.
6. Indicated height integral backsplashes and endsplashes where indicated.
7. Bowl aprons: Provide separate for field installation; fabricate using concealed connections.
8. Exposed surfaces free from marks and blemishes; completely hide through material joints.

**B. Tolerances:**

1. Variation in size:  $\pm 1/16"$ .
2. Location of openings:  $\pm 1/16"$  center to center.

**2.04 SOURCE OF QUALITY CONTROL**

- A. Verification of performance:** Certification label surface applied indicating compliance with ASTM E84-95 requirements specified above.

**PART 3 – EXECUTION**

**3.01 INSTALLATION**

- A. Solid surfacing materials, general:
  - 1. Install plumb, level, and rigid, neatly scribed to adjoining surfaces where indicated in accord with manufacturer's installation instructions and reviewed shop drawings.
  - 2. Adhere splashes to countertops and adjacent surfaces with specified adhesives.
  - 3. Bowl skirts: Attach using concealed fastener system bowl and plumbing brass are installed.
  - 4. Allow only factory finished surfaces to be exposed in finish work.
  - 5. Install wall panel shower/tub surrounds in accord with manufacturer's installation instructions to meet classification specified. Surface apply soap dishes where indicated or required, two per unit.
  - 6. Removal of code compliance labels until final cleaning and code official verification of unit performance is prohibited; early label removal or installation of non-labeled units may be cause for rejection.
- B. Sealant: Caulk perimeter joints using above specified sealant; install in accord with Joint Sealants Section.
- C. Clean installed units not more than 48 hours prior to Date of Substantial Compliance. Repair or replace damaged or stained work.

**DIVISION 7 THERMAL AND MOISTURE PROTECTION****SECTION 07010. WORK INCLUDED**

- A. Furnish labor and materials to accomplish Thermal and Moisture Protection Work indicated and specified.

**SECTION 07103. VAPOR BARRIER**

- A. Provide and install wall and ceiling polyethylene vapor barriers as specified on the drawings.

**SECTION 07210. BUILDING INSULATION**

- A. Mineral fiber insulation unfaced R-19 friction fit 5-1/2" batts in the 2<sup>nd</sup>, 3<sup>rd</sup> and 4th floor deck joist spaces.
- B. Mineral fiber insulation unfaced 2-1/2" thick friction fit batts on metal furring on exterior walls.
- C. Exterior insulation used in conjunction with the coating system shall be rigid polystyrene, thicknesses as shown.
- D. Thermal fiberglass insulation, unfaced 6" x 16" wide batts where indicated in structural stud exterior walls, shall be R-19.
- E. 3" thick mineral fiber friction fit batt insulation (2.5 lb. per cu. ft.) in interior walls as shown on the drawings.

**SECTION 07220. FOUNDATION AND SLAB INSULATION**

- A. Install foundation and slab insulation on inside of exterior foundation walls.
- B. Slab insulation shall be 1-1/2" thick Styrofoam SM, as manufactured by Dow Chemical Co., or as specified on the drawings; or an approved equal. See DIVISION 4 - MASONRY, SECTION 04210. (N), page 4/9.
- C. Furnish and install all fastening/anchoring devices and accessories for a complete installation.

**SECTION 07230. WALL AND CORRIDOR CEILING SOUND INSULATION**

- A. Install 5-1/2" unfaced mineral fiber R-19 insulation (friction fit) in the ceiling joist spaces of all areas of the 1<sup>st</sup> and 2<sup>nd</sup> floor, except: all stairwells and storage rooms not located above Guest Rooms. Note: Hold insulation away a minimum of 3" from all recessed light fixtures. Install in plumbing and demising walls as called for on the plans.

**SECTION 7240. ROOF INSULATION**

- A. Roof truss space insulation is to be minimum of R-30 fiberglass batts. (min. 12" thickness)
- B. Installation is specified in Section 07500, MEMBRANE ROOFING of this division of these Specifications.

**SECTION 07245. INSTALLATION**

- A. Installation work shall be carried out in strict conformance with the approved manufacturer's written instructions, by nailing or wiring batt flanges to wood stud, or by use of clips cemented to rigid construction surfaces.
- B. Install all batt/blanket insulation between studs, butting ends and edges together, completely filling the spaces between the studs of framing members.
- C. Install safing insulation, where shown on drawings or required by code, safing clips of proper size spaced as required, 24" o.c. maximum, in safe-off area between partition walls and roof deck; compress and install leaving no voids.
- D. Vapor barrier, if required or indicated on drawings, must be installed facing the room or warm side of the wall. Fit ends snugly and turn out vapor seal edges.
- E. Install insulation after all concealed mechanical and electrical work in furred spaces is completely installed and accepted.
- F. All insulation is to be installed per manufacturer's recommendations and specifications and in accordance with all governing codes.

**SECTION 07250. CLEANING AND PROTECTION**

- A. Protect all floors, walls, and adjacent surfaces from stains, marring, damage, insulation fibers and dust.
- B. Upon completion of work, remove all unused materials, containers, equipment and work related debris from site. Area is to be left clean and free from insulation "dust and fibers".
- C. All completed work shall be protected from damage by building operations and effects of weather. Protection shall be made by methods recommended by the insulation and materials manufacturers and as approved by the Architect.

**SECTION 07260. GUARANTEE**

- A. The Contractor shall furnish a guarantee covering this work, for a period of one (1) year from the date of the building opening, in a form acceptable to the Owner and the Architect.



**SECTION 07500. ELASTOMERIC MEMBRANE ROOF SYSTEM****1. SCOPE****A. Index:**

1. Scope
2. Manufacturer's Warranty
3. Materials
4. Inspection of Surfaces
5. Application
6. Insulation
7. Elastomeric Membrane Roofing
8. Flashing - EPDM & Metal
9. Guarantee
10. Cleaning
11. Clean Up & Warranty

Labor and materials to complete all elastomeric membrane roofing work, including membrane, adhesives, sealants, ballast, insulation, flashing, etc., as indicated on drawings, specified herein or both.

**2. MANUFACTURER'S WARRANTY**

- A. Manufacturer shall warrant roof system (materials and workmanship) to Owner for a period of fifteen (15) years.

**3. MATERIALS****A. General:**

1. Materials shall be approved, high grade products of reputable manufacturers, delivered to job in sealed, original containers bearing manufacturer's name and brand and shall be used without adulterations.
2. Prior to the award of Contract, roofer shall submit brand names and manufacturer's name for each product he intends to use. No other materials shall be delivered to job.

**B. Storage:**

1. Storage of roofing materials must be dry. Cover with waterproof covering.
2. No moisture will be tolerated on any material when roof is laid.
3. Adhesives shall be stored between 60° F and 80°F.

- C. Membrane: Compound elastomer, (EPDM) rt. mil. thick for loosely laid ballasted system..

- D. Flashing: 1/16" thickness.

- E. Bonding adhesive, splicing cement, gum tape, lap sealant, elastic sealer tape, water cutoff mastic, temporary sealants, prefabricated pipe seals, etc. All as manufactured by membrane manufacturer.

- F. Ballast: If applicable, provide 3/4" to 1-1/2" diameter, smooth, rounded stone, minimum 8 lbs., maximum 10 lbs. applied per sq. ft. with maximum depth of 2", no fines.

G. Insulation: 1" rigid polyisocyanurate insulation or manufacturer approved equal, applied so that seams do not align with metal deck seams or plywood joints below.

H. Insulation Fasteners:

1. Carlisle Sure-Seal Insulation Fastener System.
2. Lexsuko Clip.
3. Grafc, Inc., "Permafastener System".

#### 4. INSPECTION OF SURFACES

A. Roof decks will be: plywood on building.

B. All decks shall be smooth, clean, free from frost, water, sharp edges, oil, grease, loose sand or other debris, and any low spots or depressions that could hold water shall be filled or leveled by Contractor who installed deck. Commencing of work by this Contractor indicates his acceptance of surfaces.

#### 5. APPLICATION

A. Application of insulation and roofing shall be by a manufacturer approved Roofing Contractor with a minimum of five (5) years experience in the installation of this type of roofing system, and in strict accordance with manufacturer's current specifications.

#### 6. INSULATION

A. Except where otherwise specified, insulation shall be applied in order to offset all joints with wood/metal deck below.

B. Do not lay more insulation than can be covered by elastomeric membrane roofing in same day. Install water cut-offs at end of each day's work over exposed edges of insulation, using membrane. Keep insulation dry at all times.

#### 7. ELASTOMERIC MEMBRANE ROOFING.

A. Roof shall conform to the following manufacturer's specifications:

1. Compound elastomer membrane (EPDM) 45 mil. thick for loosely laid ballasted system.
  - Firestone Mtg. product per specification/plan.
  - "Sure-Seal Membrane" as manufactured by Carlisle Tire and Rubber Co.
  - Goodyear Mfg. product per specification/plan.

B. Application

1. Flat roofs: Position roofing membrane without stretching, lapping edges of adjoining sheets a minimum of 3". Allow membrane to relax for approximately one (1) hour before fastening or splicing.

2. Fold top sheet back about 12" and clean both mating surfaces at splice area with Heptane, Hexane or White Gas. Apply splicing cement to both mating surfaces at a rate of 125 linear feet of 3" splice per gallon, avoiding globs or puddles. Allow cement to dry until it does not string or stick to a dry finger touch. Apply gum tape to top sheet, roll top sheet toward splice area, remove polyethylene backing and allow top sheet to fall freely into place, avoiding stretching and wrinkles. Roll splice, using positive pressure, toward outer edge of splice. Solvent clean splice edge, extending 1" minimum onto top and bottom membranes. Apply bead on lap sealant, completely covering splice edge.
3. Mechanically fasten membrane to nailer at roof perimeter and around penetrations using nails with discs at maximum 8" o.c.
4. Provide stone ballast to a maximum depth of 2" and minimum depth of 1-1/2" on the surfaces designated on the roof plan. Adhere or glue down membrane on Saddle areas as indicated.

#### 8. FLASHING (NOT METAL)

- A. Perimeter flashing around penetrations shall be done using longest pieces practicable. Complete splice between flashing and main roof sheet before bonding flashing to vertical surface. Seal splice 3" minimum beyond fasteners which attach horizontal membrane to nailer. Apply bonding adhesive to both membrane and surface to which it is being bonded. Allow adhesives to dry and carefully roll flashing into adhesive, avoiding bridging at corners.
- B. Flash all pipes with prefabricated pipe seals.

#### 9. GUARANTEE

- A. Roofing Contractor shall guarantee materials and workmanship for all roofing and flashing (not including sheet metal work) against all defects not caused by Acts of God for a period of fifteen (15) years from period of final acceptance. Any defects that might arise during period of guarantee shall be repaired immediately upon receipt of proper notice at no cost to the Owner.

#### 10. CLEANING

- A. From time to time during progress of work, as directed by Architect, and at completion of work, remove all rubbish, debris, dirt, equipment and unused materials from site and clean all adjoining surfaces that have been soiled with roofing materials.

#### 11. CLEAN UP & WARRANTY

- A. Collect all work related debris and remove from the job site.
- B. The Contractor shall furnish a guarantee covering this work, for a period of fifteen (15) years from the date of the building opening, in a form acceptable to the Owner and the Architect

**SECTION 07600 FLASHING AND SHEET METAL****PART 1 - GENERAL****1.01 WARRANTY****A. Special warranty:**

1. Flashing and sheet metal work: Watertight and free of defects in materials and workmanship for two-year period warranty.
2. Fluoropolymer finish: Remain free of checking, crazing, peeling, chalking, or fading for 20 year period; chalking not more than eight units, color retention not more than five units.
3. Begin warranties at Date of Substantial Completion.

**PART 2 - PRODUCTS****2.01 MATERIALS****A. Sheet metal:**

1. General: Follow gauge, thickness, or weight requirements in SMACNA Manual for intended use, but not less than indicated below. Actual gauges for various items may be indicated in FABRICATION Article below or referred to SMACNA Manual.
2. Galvanized metal:
  - a. Minimum 24-gauge, uncoated thickness, commercial grade galvanized steel, continuous galvanized in accord with ASTM A653A-96, coating designation G90; coated with not less than 0.9 oz. zinc PSF.
  - b. Finish: Coil coated finish; finish specified in "Special finishes" Paragraph below.
3. Aluminum:
  - a. Thickness: 0.027" minimum thickness.
  - b. Type: ASTM B209-90, 3005-H25 alloy; coil coated finish; finish specified in "Special finishes" Paragraph below.
4. Sheet lead: Minimum 2-1/2 PSF, hard type.

**B. Soldering materials:**

1. Solder: ASTM B32-76, alloy grade 50A, 50% pig lead and 50% block tin.
2. Solder flux for:
  - a. Galvanized metal: Muriatic acid neutralized with zinc.
  - b. Lead: Non-corrosive rosin.

**C. Mastic: ASTM D4586-86, Type II, fibrated asphalt flashing cement.****D. Fasteners: Same material or compatible with sheet metal being fastened.**

1. Nails: Flathead, needle point, not less than 12 gauge; sufficient length to penetrate substrate 1" minimum.
2. Expansion shields: Lead or bronze sleeves.
3. Screws: Self-tapping type with round heads.
4. Bolts: Furnished complete with nuts and washers.
5. Rivets: Round head, solid shank.
6. Blind clips and cleats: Same gauge as sheet metal.
7. Neoprene washers for nails.

**E. Caulk: Pecora Corp; BR-96 non-skinning, non-drying butyl caulk.**

**F. Special finishes:**

1. Prefinished colored coating finish:
  - a. Type: System for AAMA 605.2-92 coil coating system application.
  - b. Colors: PPG Industries, Inc.; Bone White.
  - c. Color match touch-up finishes using Kynar or Hylar ADS PVDF formulation.

**2.02 MANUFACTURED UNITS**

**A. Downspout boots:**

1. Acceptable manufacturers:
  - a. McKinley Iron Works, Inc.
  - b. Neenah Foundry Company.
2. Type: ASTM A48-83, Class 35, gray iron castings with one coat rust inhibiting primer; minimum 24" long. Coordinate with downspouts and drainage piping configurations and sizes.

**2.03 FABRICATION**

**A. Shop assembly:**

1. General:
  - a. Fabricate sheet metal in accord with reviewed shop drawings and industry standards.
  - b. Form sheet metal work with clear, sharp, and uniform arises. Hem exposed edges.
  - c. Fabricate corners with minimum 2'-0" returns each side of return; weld or solder mitered corner complete, shop finish to match adjacent material; fully seal joints.
2. Galvanized metal materials:
  - a. Solder sheet metal joints with heavy, well-heated coppers. Pre-tin joints not less than 1-1/2" wide. Sweat solder through seam's full width.
  - b. Provide riveted and soldered joints.
  - c. Neutralize remaining acid with ammonia or baking powder solution; rinse with water.
3. Aluminum materials:
  - a. Make joints in aluminum sheets less than 0.040" thickness using flat-lock seams, 3/4" wide.
  - b. Fill seams with exterior sealant.
4. Linear sheet metal items: 10'-0" sections, minimum, except as otherwise noted; form flashing using single pieces for full width.
5. Form specified sheet metal items in accord with SMACNA details noted, gauge indicated in SMACNA description of particular Figure; gauges for items not specifically noted below are in accord with SMACNA practice. Use longest lengths possible for linear material.
  - a. Gutter: SMACNA Manual, Figure 1-2, Style K, Ogee.
  - b. Downspouts: SMACNA Manual, Figure 1-32A, Round.
  - c. Downspout-gutter connection: SMACNA Manual, Figure 1-33D, Round.
  - d. Downspout hanger: SMACNA Manual, Figure 1-35D, Round.
  - e. Drip edge: 26 gauge galvanized steel; form in accord with SMACNA Manual, Figure 4-22C and 4-22D.
6. Seaming:
  - a. Comply with SMACNA Manual, Figure 3-2 except details 12 and 16 and Figure 3-3 except details 18, 20, 21, and 28 unless otherwise indicated on Drawings or indicated in other referenced SMACNA Figure.
  - b. Flat-lock seams: Finish not less than 3/4" wide.
  - c. Soldered lap seams: Finish not less than 1" wide.
  - d. Other lap seams: Overlap not less than 4" unless otherwise indicated.
  - e. Seams: Orient as watershed for direction of water flow.

**PART 3 - EXECUTION****3.01 INSPECTION**

- A. Verification of conditions: Verify locations of roof openings and penetrations are in accord with reviewed shop drawings.

**3.02 INSTALLATION****A. Sheet metal:**

1. Install work in accord with reviewed shop drawings and industry standards. Provide sheet metal items true to line, without buckling, creasing, warp, or wind in finished surfaces.
2. Coordinate flashing at roof surfaces with roofing work to provide weathertight condition at roof terminations.
3. Perform field joining of lengths specified for shop fabrication.
4. Isolate dissimilar materials to prevent electrolysis. Separate using bituminous paint or roofing felt.
5. Seaming:
  - a. Follow requirements specified in FABRICATION Article.
  - b. Flatlock seams with cleats soldered.
  - c. Lap seams occurring in members sloping 45° or more, 4" minimum; bed in flashing cement compatible with roofing membrane.
6. Secure sheet metal items using continuous cleats, clips, and blind fasteners as indicated; exposed face fastening is prohibited.
7. Fastening:
  - a. Nails: Confine to one edge only of flashing 1'-0" or less in width. Space nails at 4" O.C. maximum; use neoprene washers.
  - b. Cleats: Continuous; form to profile of item being secured.
  - c. Clips: Minimum 2" wide by 3" long; form to profile of item being secured. Space at 2'-0" O.C. maximum, except as otherwise indicated.
8. Form joints in linear sheet metal to allow for ½" minimum expansion at 20'-0" O.C. maximum and 8'-0" from corners. Provide 1'-0" wide cover plate at intersections. Form plates to profile of sheet metal items; follow requirements specified in FABRICATION Article for seaming. Apply linear sheet metal items in full bed of butyl caulk under cover plate.
9. Gutters and downspouts:
  - a. Construct with riveted and soldered joints, lap 1" minimum in direction of flow; ¾" minimum expansion joints at 50'-0" O.C. maximum. Form expansion joints in accord with SMACNA Manual, Figure 1-6.
  - b. Hang gutters with high points equidistant from downspouts, evenly sloped toward downspouts.
  - c. Gutter supports: SMACNA Manual, Figure #1-18A.
  - d. Secure downspouts to exterior walls at 6'-0" O.C. maximum using straps and expansion type fasteners. Lap downspout joints, 1-1/2" minimum lower over upper and poprivet.
  - e. Terminate downspouts within downspout boot; seal perimeter of boot/downspout intersection.
10. Roof penetration flashing:
  - a. Flashing boots and other specialty flashing items required for other Section specified mechanical and electrical penetrations furnished in other Sections: Coordinate installation into roofing system in accord with flashing item manufacturer's installation instructions and roofing system manufacturer's requirements to receive roofing system manufacturer's stated warranty.

- b. Roof penetration flashings not furnished under other Sections: Coordinate installation into roofing system in accord roofing system manufacturer's requirements to receive roofing system manufacturer's stated warranty.
- B. Downspout boots:
  - 1. Install at ground termination of downspouts; attach to substrate in accord with boot manufacturer's installation instructions.
  - 2. Leave ready for downspout installation; finish in accord with Paints Section.
- C. Flashing:
  - 1. Install sheet flashing at junctures of roof areas to sidewalls, parapets, curbs, and other indicated areas.
  - 2. Install sheet flashing at heads of weather exposed doors and windows similar to SMACNA Manual, Figure 4-21.
  - 3. Install sheet flashing at juncture of roof area to fire walls, chimneys, and high walls at rake using stepped flashing details; continuous sheet not permitted. Coordinate flashing at firewalls with reglet installation.

## **SECTION 07650 FLEXIBLE FLASHING**

### **PART 1 - GENERAL**

NOT USED

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURED UNITS**

- A. Flexible flashing:
  - 1. Copper core type:
    - a. Acceptable products:
      - 1) Advanced Building Products, Inc.; Cop-R-Kraft Duplex.
      - 2) Afco Products, Inc.; Cop-A-Bond Duplex.
      - 3) Sandell Manufacturing Company, Inc.; Copper Kraft.
      - 4) York Manufacturing, Inc.; Cop-R-Tex Duplex.
    - b. Characteristics:
      - 1) Copper weight: 3 oz. per sq. ft.
      - 2) Fabric: Waterproofed creped Kraft paper; bonded to each face copper core with material identification at regular intervals.
      - 3) Size: Manufacturer's standard width rolls.
      - 4) Mastic: Manufacturer's standard for specified flashing.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. General:
  - 1. Install where indicated, specified, or required in accord with flashing manufacturer's written instructions and as follows. Splicing material on material width to manufacture wider pieces is prohibited unless flashing detail requires material wider than normally manufactured.
  - 2. Extend flashing 6" minimum, beyond opening, each side without stretching flashing material. Lap end joints 4" minimum; seal joints completely with specified flashing adhesive or tape.

3. Stud back up: Start flashing  $\frac{1}{2}$ " in from outside face of exterior wythe, extend through cavity, rising not less than 6", bed in full bed of adhesive against sheathing material; fasten to each stud at top with headed fastener.
4. Fold ends of flashing at end of opening to form dam.
5. Patch punctures with tape or adhesive and material.

## **SECTION 07700. DAMPPROOFING**

- A. Dampproofing shall be brush or trowel on application and each material used shall be applied in strict accordance with the written instructions of that product. Manufacturers of waterproofing materials shall be by one of the following or an Architect approved equal:
1. Sonneborn-Contech "Hydrocide 600B" Semi-Mastic.
  2. Meadows, Inc. "Sealmastic Asphalt Emulsion Dampproofing Type 2" - Brush Grade.
  3. Karnak Chemical Corporation "Karnak 83" - Brush.
  4. J & P Petroleum Products, Inc. "Tex-Mastic Construction Materials 712" Semi-Mastic.
- B. Installation:
5. Masonry shall be cleaned of all mud and loose mortar, and joints filled with mortar.
  6. All materials and equipment shall be installed in strict accordance with the manufacturer's specifications and recommendations for each product used unless specified otherwise by the Architect.
  7. Install on elevator pit walls and exterior walls as indicated on the drawings.
- C. Protection and Cleaning:
8. Protect work of other trades by not allowing liquid and mastic compounds to enter and clog drains and/or conductors. Prevent spillage and migration onto other surfaces of work, by masking or otherwise protecting adjoining work. Use manufacturer's recommended products for cleaning of any spillage.

## **SECTION 07840 FIRESTOPPING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section includes:
1. Materials for complete firestop installation of penetrations consisting of pipe, duct, cable, other electrical devices, or blank openings in fire rated walls, floors, and partitions.
  2. Construction joint firestops within walls, floors, or intersection of floors to exterior walls, or intersection of top of walls to ceilings.
  3. Membrane penetration protection for fire-rated walls.
  4. Top of wall and construction joint smoke-stopping on smoke partitions.
  5. Top of wall firestopping in fire-rated partitions.

#### **1.02 DEFINITIONS**

- A. Terms:
1. Alpha - Alpha - Numeric system for penetration identification: UL 1993 system to universally identify and categorize penetrations.
    - a. First alpha grouping: Designates penetration type; "F" for floors, "W" for walls, "C" for either or both floors and walls.



- b. Second alpha grouping: Further designates significant assembly characteristics; "A" for concrete floors with minimum thickness less than or equal to 5", "J" for concrete or masonry walls with minimum thickness less than or equal to 8".
- c. Numeric grouping: Designates penetrating item; 1000-1999 for metal pipe, conduit, or tubing, 5000-5999 for insulated pipes.
- d. Example; assembly F-A-5001 means Floor penetration - Concrete substrate less than or equal to 5" - Insulated pipes.
- 2. Construction gap: Gap, joint, or opening, whether static or dynamic, where top of wall may meet floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or linear breach in rated barrier.
- 3. Fire rated: Having ability to withstand effects of fire for specified time period, as determined by qualified testing.
- 4. Fire rated assembly: Floor, wall, or other partition also to withstand design fire and hose stream test without failure.
- 5. Fire resistance rating: Time, in hours, for which rated assembly can withstand effects of fire without burn-through or structural failure.
- 6. Firestop: Means of sealing openings in fire rated assemblies to preserve or restore fire resistance rating.
- 7. Firestop system or "system": Combination of materials or devices, including penetrating items, required to make up complete firestop.
- 8. Intumescent: Having the quality to enlarge, swell, or expand with heat.
- 9. Membrane penetration: Penetration of fire-rated wall or floor breaching only one side of barrier.
- 10. Penetrating item: Pipe duct, conduit, cable tray, cable, or other element passing through opening in fire rated assembly.
- 11. Through penetration: Penetration of fire-rated wall or floor completely breaching barrier.
- 12. VOC: Volatile organic compounds.

### 1.03 SYSTEM DESCRIPTION

#### A. Design requirements:

- 1. Designs selected for installation: Provide fire resistance rating at least equal to hourly resistance rating of floor, wall, or partition into which firestop design is installed.
- 2. Firestop systems and materials:
  - a. Not require special tools for installation.
  - b. Do not emit hazardous, combustible, or irritating fumes during installation, curing, or use.
- 3. When more than one firestop design is applicable, evaluate individual product characteristics for secondary benefits in performance, e.g., environmental/water sealing or ease of installation or modification.

#### B. Performance requirements:

- 1. Fire and hose stream on material: Meet requirements of ASTM E814-83 (1991) for F (Flame) Rating or T (Temperature) Rating required by local code.
- 2. Fire tests, ASTM E119-83: Pass requirements when used in assembly.
- 3. Firestop systems do not re-establish the structural integrity of load bearing partitions. Consult Architect prior to drilling or coring operations in any load bearing assembly.
- 4. Firestop systems are not intended to support live loads or traffic. Curbs or steel plates may be required to restrict or accommodate potential traffic. Notify Architect, in writing, if these limitations may be violated.
- 5. Comply with UL 1399 where dynamic movement is anticipated.

#### 1.04 SUBMITTALS

- A. Product data:
  - 1. Complete list of products for use; indicate compliance with VOC limits.
  - 2. Data for fire or smoke rated insulation; indicate complete installation instructions for maintaining ratings of wall or floor assemblies to meet code requirements.
  - 3. "Manufacturer's Safety Data Sheets", (M.S.D.S.), for materials.
- B. Shop drawings: Complete schedule of rated penetrations, locations, and proposed rated materials to fill penetrations in accord with certified testing laboratory designs and alphanumeric system, e.g., UL Alpha - Alpha - Numeric system.
- C. Quality control submittals:
  - 1. Certificates:
    - a. Indicate materials supplied or installed are asbestos free.
    - b. Indicate compliance with applicable VOC limits.
  - 2. Test reports: Products supplied; indicate recognized laboratory test results for same type conditions encountered on Project.
  - 3. Manufacturer's instructions:
    - a. Exact procedures for installation of rated firestop material to maintain wall, floor, or combination assemblies ratings; indicate penetration hole/pipe size relationship, if required, for clearances to obtain results same as tested assemblies.
    - b. Disposal requirements for expended material or partially expended containers.
- D. Contract closeout submittals:
  - 1. Project record documents: Completion and inspection reports in FIELD QUALITY CONTROL Article.

#### 1.05 QUALITY ASSURANCE

- A. Qualifications, installer:
  - 1. Certified by firestop materials manufacturer; include original certification date, recertification dates, as applicable, and names of individuals trained from installer's staff.
  - 2. Completed five Projects, minimum, of comparable magnitude using specified system in last three years.
  - 3. Submit project reference list for review and verification; non-verifiable projects will be cause for installer rejection.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection: Dispose expended or partially expended material containers in accord with EPA requirements.

#### 1.07 SEQUENCING AND SCHEDULING

- A. Additional firestopping requirements may be created by construction activities specified in other sections.
  - 1. Identify locations requiring firestopping.
  - 2. Schedule and coordinate firestopping installation after completion of duct, piping, electrical runs, and prior to covering or concealing openings or eliminating access.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. General:

1. Products of manufacturers indicated below may be used singly or in combination to meet ratings of adjacent wall, floor, or perimeter.
2. Using product or products singly or in combination requires recognized testing laboratory test results for indicated application; system selection is optional unless testing requires use of one particular type.
3. Intent is to maintain rated integrity of
  - a. wall, floor, or ceiling at penetrations providing 40% tensile elongation and compression where penetrating item is carrying hot/cold liquids/gasses or attached to vibrating machinery.
  - b. floor regardless of moisture and water exposure using silicone based sealing materials at penetrating item.
4. No ampacity de-rating of cable at penetrations.
5. Reviewed schedule indicates insulation type or types and locations used.
6. Penetrations, smoke and fire fall into two categories:
  - a. Not requiring intumescent qualities.
  - b. Requiring intumescent qualities, such as PVC pipe or other dissolving materials.

#### B. Acceptable manufacturers:

1. Putty, mortar, re-entry type, sealants, wrap strip, foam, composite board, spray applied mastic, elastomeric spray film, and metal collar/cuff assemblies:
  - a. Flame Stop, Inc.
  - b. Hilti, Inc.
  - c. IPC Corp.
  - d. Isolatek International Corp.
  - e. Nelson Firestop Products, Inc.
  - f. Rectorseal, Inc.
  - g. Specified Technologies, Inc.
  - h. 3M Company/Construction Markets Division.
  - i. USG Company.
2. Safing insulation:
  - a. Acceptable products:
    - 1) Fibrex; FBX Safing Insulation.
    - 2) USG Acoustical Products Company; Thermafiber Safing Insulation.
  - b. Characteristics:
    - 1) Composition: ASTM C612-83, Class 3, semi-rigid to rigid mineral fiberboards.
    - 2) Density: Four PCF, nominal.
    - 3) Thickness: Required for penetration rating.
    - 4) Combustibility, ASTM E136-82: Noncombustible.
    - 5) Flame spread, ASTM E84-87: 15, maximum.
  - c. Accessories: USG Acoustical Products Company 12 gauge Snap-on Clip Type A or Prong Clip Type D standard impaling clips or similar clips of other manufacturers code approved for use.
3. Accessories:
  - a. Furnish damming materials and other materials for installation.
  - b. Permanent labels to identify penetration with space for name of installing company, date installed, and UL or WH penetration designation.

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### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verification of conditions: Verify that penetrating elements and supporting devices have been installed and temporary lines have been removed.

#### **3.02 PREPARATION**

- A. Clean surfaces in contact with penetration seal materials of dust, dirt, grease, oil, loose materials, rust, and other substances.

#### **3.03 INSTALLATION**

A. General:

1. Install firestopping materials in accord with tested configurations; system selection is optional unless testing requires use of one particular type.
2. Locations, general:
  - a. Cavities of floor-to-floor penetrations; include spaces around conduit, cable, piping, and duct penetrations.
  - b. Rated wall and ceiling penetrations; include spaces around conduit, cable, electrical boxes, piping, and duct penetrations.
  - c. Vertical service shaft penetrations.
  - d. Openings where fire rated walls terminate at metal floor or roof deck.
  - e. Membrane penetration protection for fire-rated walls.
  - f. Top of wall and construction joint smoke stopping on smoke partitions.
  - g. Top of wall firestopping in fire-rated partitions.
  - h. Construction joint firestops within walls, floors, or intersection of floors to exterior walls, or intersection of top of walls to ceilings.
  - i. Other locations indicated or required to maintain rated assembly integrity.
3. Follow manufacturer's recommendations to obtain a smooth, professional finish.
4. Remove forms or damming materials, if used, after designated cure time unless support materials used are fire resistant or noncombustible nature.
5. Reviewed submittal schedule indicates type or types firestopping used and actual locations.

- B. Install permanent labels at each penetration, in conspicuous location on pipe, duct, or other hard surface; indicate WARNING - DO NOT DISTURB, UL assembly configuration installed, ratings, date installed, installing company, and installer.

#### **3.04 FIELD QUALITY CONTROL**

A. Inspection:

1. Penetration seals inspected by third party recognized firestopping inspection/testing firm for correct installation, adhesion, and curing appropriate for respective seal materials.
2. Inspection/testing firm fees included in Contract Sum.
3. Keep areas of firestopping work accessible; notify code authorities and designated inspection/testing firm, in writing, of work released for inspection.
4. Document completion and inspection; file completion and inspection reports with Project closeout documents.

#### **3.05 ADJUSTING**

A. Repairs and modifications:

1. Identify damaged or re-entered seals requiring repair or modification.
2. Remove loose or damaged materials.

3. If penetrating elements are to be added, remove enough material to insert new elements being careful not to cause damage to balance of seal.
4. Ensure surfaces to be sealed are clean and dry.
5. Install materials in accord with materials approved by manufacturer as suitable for repair of original seal.

## **SECTION 07900. SEALANTS AND CAULKING**

### **1.0 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Conditions, Supplementary Conditions and applicable provisions of DIVISION 1 are hereby made a part of this section as fully as if repeated herein.

#### **1.2 DESCRIPTION OF WORK**

1. Provide, furnish and install all labor, materials, equipment and tools necessary to complete all sealant and caulking work as indicated and shown on the drawings and specified herein.
2. Caulking and sealing of joints occurring at meeting of different materials at exterior and interior of building, unless otherwise indicated on drawings. (Confirm color with Architect.)
3. Caulking the perimeter of all exterior frames (color to match frames) for all entrances, louvers, and doors (color to match wall materials) in contact with exterior finish and steel lintels.
4. Caulking and sealing of all exterior and interior control joints.
5. Caulking and sealing of all exterior and interior of windows (color to match frame).
- F. Caulking of all the interior and exterior perimeters of the through-wall heating/cooling units and mechanical louvers. Exterior - color to match wall material. Interior - Verify color with Owner.

#### **1.3 JOB CONDITIONS**

- A. Weather conditions shall be in accordance with manufacturer's recommendations before permitting sealant and caulking work to be performed.
- B. This Sub-Contractor must inspect all joint surfaces and substrate conditions under which joint sealer work is to be performed and notify Contractor in writing of any unsatisfactory conditions. Commencing of work indicates acceptance of surfaces and conditions, after which any defective work installed on questionable substrate will be replaced at this Contractor's expense.

#### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label. Store materials not in actual use in tightly covered containers and in accordance with manufacturer's recommendations.

#### 2.1 MATERIALS - EXTERIOR

- A. Caulking compound shall be equal to LP liquid polysulfide polymer by Thiokol. Color shall match, as close as possible, the adjoining materials to the caulking. Caulking shall be applied to surfaces that are clean or have been properly cleaned as required. **Submit color sample to Architect for approval.**
- B. Sealant compound shall be a one-component polyurethane base sealant of non-sag consistency, produced by one of the following manufacturers or an Architect approved equal:
  - 1. Mameco International - Vulkem 116.
  - 2. Tremco - Dymenic or Mono.
  - 3. Sika Corporation - Sikaflex 1A.
- C. Caulking and sealant backup material shall be closed-cell expanded polyethylene foam in rod shape, or other Architect approved equal material which shall form no bond with sealant.
- D. Caulking for exterior foot traffic areas shall be equal to Tremco "Dymeric" traffic grade.
- E. Primer shall be non-staining primer as recommended by sealant compound manufacturer.

#### 2.2 MATERIALS - INTERIOR

- A. All craftsmanship to be similar to above section Materials - Exterior.
- B. Color: Clear caulking to be used around interior of the window frames at sides and head. Verify color with Owner for at sill, at vanity and around HVAC unit.
- C. Interior sealing and caulking material shall be an acrylic latex caulk.
- D. Caulking in bath and vanity area to be General Electric 712 Silicon Rubber Tub & Tile Caulk.
- E. Provide caulking at perimeter of bathtub module.

#### 3.01 INSTALLATION

- A. All materials shall be installed in accordance with the manufacturer's specifications or recommendations unless otherwise specified or directed by the Architect.
- B. All caulking and sealing shall be done by men experienced in caulking work. Caulking shall be applied using the pressure best suited to give the desired results yet completely filling the space without smearing or extending beyond the adjoining materials.

- C. When wall is to be painted, the caulking shall be done after the priming but before the last coat of paint is applied on the adjoining materials (such as metal door frames, etc.).
- D. Apply sealant using pressure gun with proper nozzle, or per recommendations of manufacturer for product being used.
- E. Caulking compound: Approved gun type, plastic composition which will not harden, crack or flow between temperatures of 10° F below and 100° F above 0° F., free from oils or other ingredients which would stain masonry or stone. Caulking compound shall conform to Federal Specifications TT-S-00230.
- F. Apply caulking compound with a pressure gun having nozzle to fit into joints or per recommendations of manufacturer. Fill joints solidly and smoothly and without thin edges; remove excess compound and leave adjoining surfaces clean. Joints shall be watertight. Do not seal joints until they are substantially in accordance with details on drawings and/or applicable division of these specifications.
- G. Backing for caulking shall be furnished and installed by this Contractor. Use form cord Type FC in diameter as required by Progress Unlimited, Inc., #(217) 689-7030, or Architect approved equal.
- H. Clean joints and spaces to be caulked leaving free of dust, dirt, loose yarn, dampness and any other material that will adversely affect adhesion of caulking compound to sides of joint. Unless otherwise indicated, joints shall be not less than 1/4" wide.
- I. Exterior: Pack joints with form cord where required so as to provide sealant space depth not less than 1/2" or twice the width of joint, whichever is greater, unless otherwise indicated.
- J. Exterior: Primer shall be per manufacturer's requirements.

### 3.2 CURE AND PROTECTION

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations. Advise General Contractor of procedures required for cure and protection of joint sealers during construction period to prevent deterioration or damage before project completion. Replace or restore any sealant work that has been damaged or deteriorated during construction.

### 3.3 CLEAN-UP

- A. At conclusion of this work, the Contractor shall gather all debris and remove from job site.

### 3.4 GUARANTEE

- A. The Contractor shall furnish a guarantee covering this work, for a period of five (5) years from the date of the building opening, in a form acceptable to the Owner and the Architect

**DIVISION 8 DOORS AND WINDOWS****SECTION 08110 STEEL DOORS AND FRAMES****PART 1 - GENERAL****1.01 DEFINITIONS****A. Terms:**

1. Alloyed coating: Same as galvanized.
2. Galvanized: Zinc-iron alloy-coated steel sheet by hot dip process on galvanized steel sheet producing non-spangled coating characterized by dull gray appearance.
3. Paint grip: Same as galvanized coating; term used in some industry areas.
4. Galvanizing: Zinc coated steel by the hot dip process characterized by multi-faceted crystal structure occurring during normal solidification of hot dip zinc coating on steel sheet; generally referred to as spangle.

**1.02 SYSTEM DESCRIPTION**

- A. Performance requirements, primer paints and surface preparation: Coordinate surface preparation and primer paint selection to be compatible with final finish paints. Use paints specified in Paints Section as basis for selections.

**1.03 QUALITY ASSURANCE****A. Qualifications:**

1. Manufacturer/fabricator: Member of S.D.I. and listed in "Acceptable Manufacturers" Paragraph.

- B. Certifications: Furnish fire-rated components bearing factory-applied labels of UL, FMRC, or WH; give component rating.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS****A. Acceptable manufacturers:**

1. Ceco Door Products.
2. Curries Company.
3. S.W. Fleming Limited.
4. Mesker Door, Inc.
5. Pioneer Industries.
6. Republic Builders Products Corp.
7. Steelcraft.

**2.02 MATERIALS****A. Steel:**

1. ASTM A366A-96, cold rolled steel sheet free of scale, pitting or surface defects.
2. Galvanized frames and doors:
  - a. Type: ASTM A653A-96, zinc coated, coating designation G60.
  - b. Galvanized steel locations:
    - 1) Exterior openings.



- 2) Kitchens.
- 3) Toilets.
- 3. Galvannealed coating: ASTM A653A-96, zinc coated, coating designation A25 permitted for door and frame units not requiring galvanizing indicated in "b." above. Note: This coating does not require factory primer.
- 4. Wipe coat galvanized steel (WCGS) components are prohibited.
- B. Primer paint minimum requirements for field finished units; use shop primer compatible with Paints Section specified primers and topcoats; primer not required for door and frame units fabricated using galvannealed coating: One coat manufacturer's standard baked-on enamel, pinhole free, rust-inhibitive primer; 0.7 mils DFT minimum thickness.
- C. Door hardware: Specified in Door Hardware Section.
- D. Glass: Specified in Glazing Section.

## 2.03 MANUFACTURED UNITS

- A. Frame construction:
  - 1. General:
    - a. Roll formed or pressed steel frames for doors, sidelights, tubular mullions and borrowed lights, and other indicated openings.
    - b. Dust cover boxes or mortar guards: Not less than 26 gauge steel at hardware mortises to be set in masonry partitions.
    - c. Reinforcement for scheduled hardware: S.D.I.-107-84, galvanized for galvanized units, and as follows:
      - 1) Hinge: Eight-gauge, minimum.
      - 2) Strike: 16-gauge, minimum.
      - 3) Closer: 14-gauge, minimum.
      - 4) Projection weld to frame.
  - 2. Welded frame:
    - a. Welded steel corner construction; weld type; use for appropriate frame construction:
      - 1) Roll formed frames:
        - a) Standard of quality: Ceko Door Products; Welding Type T-3.
        - b) Characteristics: Machine-mitered corners with faces mitered, butted stops; full weld joints, outside face weld and full web weld.
      - 2) Pressed steel frames:
        - a) Standard of quality: Ceko Door Products; Welding Type V-4.
        - b) Characteristics: Saw-mitered corners with faces and stops mitered; full weld joints, inside face weld only.
    - b. Welded frames with temporary spreaders during shipment, handling, and installation.
    - c. Gauge: 16-gauge.
    - d. Stops: 5/8" deep minimum.
    - e. Labels: Attached label for labeled openings.
  - 3. Manufacturer's standard rubber, neoprene, or silicone silencers; locations indicated below.
- B. Frame anchors:
  - 1. Wall anchors for frame attachment to masonry construction:
    - a. Type: Adjustable, flat, corrugated, or perforated, T-shaped anchors with leg not less than 18-gauge by 2" wide by 10" long; hot dip galvanized.
    - b. Anchors at 2'-0" O.C., maximum, each jamb.
    - c. UL type anchors for fire-rated frames.

2. Wall anchors for frame attachment to gypsum board partitions:
    - a. Manufacturer's standard adjustable metal stud type; 18-gauge, minimum.
    - b. Manufacturer's standard closed steel stud anchor (CSSA); 18-gauge, minimum.
    - c. Anchors at 2'-0" O.C., maximum, each jamb.
    - d. UL type anchors for fire-rated frames.
  3. Floor anchors: Clip type to receive two fasteners per clip, 18-gauge steel, minimum; use additional jamb anchor where floor anchor cannot be used.
- C. Door construction:
1. General:
    - a. Reinforcement for scheduled hardware: S.D.I.-107-84, galvanized for galvanized units, galvanized for galvanized units and as follows:
      - 1) Door hinge: Eight-gauge, minimum.
      - 2) Lock: 16-gauge, minimum.
      - 3) Closer: 14-gauge, minimum.
      - 4) Projection weld to door.
    - b. End closures; top and bottom: Flush channel treatment with no holes or openings; inverted channel prohibited on doors.
    - c. Prohibited practice: Visible joints or seams on exposed faces.
  2. Classification:
    - a. Exterior units:
      - 1) Grades, models, and gauge: SDI Designation Grade III, Extra Heavy Duty, Model 2, Seamless, 16-gauge material.
      - 2) Construction: SDI Designation Hollow Metal.
      - 3) Core: Honeycomb.
    - b. Interior units:
      - 1) Guestroom entry
        - a) 6 panel prefinished metal per drawing
      - 2) Closets, bathroom, individual office, and storage rooms:
        - a) SDI Designation: Grade I, Standard Duty, Model 1, Full Flush; Hollow Metal; 20 gauge material.
        - b) Core for closets and storage rooms: Honeycomb.
        - c) Core for bathrooms, toilet rooms, individual offices: Polystyrene (EPS) board full door thickness bonded to facer sheets
      - 3) Other locations:
        - a) SDI Designation: Grade II, Heavy Duty, Model 2, Seamless, Hollow Metal; 18 gauge material; full welded seam or stitch welded and interlocking channels with epoxy seam filler.
        - b) Core: Polystyrene (EPS) board bonded to facer sheets.
    - c. Rated units: SDI Designation Grade II, Heavy Duty, Model 2, Seamless, Hollow Metal; 18 gauge material; full door thickness polystyrene (EPS) board bonded to facer sheets.
    - d. Mechanically join rails to stile forming neat face seam.
  3. Thickness: 1-3/4", unless otherwise indicated.
  4. Design: Indicated.
  5. Labels: Attached label indicating classified rating for labeled openings.
- D. Applied stops: Formed, 20 minimum gauge steel with mitered corners; prepare for gasket, if indicated. Attach using countersunk oval head machine screws at 1'-0" O.C. maximum.
- E. Fire resistant glazing sealant, acceptable product: Rectorseal, Inc.; Metalcaulk Series for installation of wire glass in openings.

## 2.04 FABRICATION

### A. Shop assembly:

1. General:
  - a. Fabricate members in accord with S.D.I.-100-91, except where more stringent requirements are specified. Using fabricators other than S.D.I. member is prohibited.
  - b. Fabricate doors and frames to sizes and profiles indicated on reviewed shop drawings; provide specified joinery matching approved samples.
  - c. Glaze using indicated glazing and sealant type.
2. Hardware preparation:
  - a. Factory prepare units for hardware in accord with templates furnished under Door Hardware Section and in accord with S.D.I.-100-91.
  - b. Reinforcement: Reinforce components for hardware installation in accord with S.D.I.-107-84.
  - c. Punch single leaf frames to receive three silencers; double frames to receive one silencer per leaf, at head. Install silencers.
3. Completed units required to meet requirements indicated in ANSI A250.4-1994.

### B. Shop finishing:

1. Preparation prior to primer application; primer not required for galvanized coating:
  - a. Grind smooth and flush welds exposed in final construction; mechanically clean, SSPC-SP3, weld flux and mill scale from exposed and concealed surfaces.
  - b. Repair abraded or damaged galvanized surfaces prior to application of surfacing materials. Prepare surfaces in accord with SSPC-SP2, Hand Tool Cleaning or SSPC-SP3, Power Tool Cleaning, minimum. Apply zinc rich primer meeting SSPC-Paint 20, Type I, Inorganic at 2.5 mils DFT, minimum.
  - c. Ferrous metals, not galvanized:
    - 1) Clean surfaces after fabrication and immediately prior to shop painting in accord with SSPC-SP2, Hand Tool Cleaning; SSPC-SP3, Power Tool Cleaning; or SSPC-SP6, Commercial Blast Cleaning. Surface cleaning requirements are dependent on final service location and environment. Solvent clean in accord with SSPC-SP1 to remove grease, oil, and contaminants; wipe dry with dry cloth.
    - 2) Apply primer specified in "Primer paint" Paragraph in MATERIALS Article above to specified mils DFT. Apply within four hours after cleaning and before rust-bloom occurs. Paint only in conditions acceptable to shop primer paint manufacturer's application data.
  - d. Galvanized metal:
    - 1) Repair abraded or damaged galvanized surfaces prior to application of surfacing materials. Prepare surfaces in accord with SSPC-SP2-1982, Hand Tool Cleaning or SSPC-SP3-1982, Power Tool Cleaning; apply zinc rich primer meeting SSPC-Paint 20, Type I, Inorganic at 2.5 mils DFT, minimum.
    - 2) Wash with xylol to remove grease, oil, and contaminants; wipe dry with dry cloth.
    - 3) Prepare galvanized sheared surfaces in same manner as "Ferrous metals, not galvanized" subparagraph above.
    - 4) Apply primer specified in "Primer paint" Paragraph in MATERIALS Article above to specified mils DFT.
2. Coat entire frames and accessories after fabrication, inside and outside; primer not required for galvanized coating.
3. Coat entire doors after fabrication; primer not required for galvanized coating.

**C. Tolerances:**

1. Frames:
  - a. Overall dimensions:  $\pm 3/64$ " in opening height;  $+1/16$ ",  $-1/32$ " in opening width.
  - b. Throat opening:  $\pm 1/16$ ".
  - c. Frame depth:  $\pm 1/32$ ".
2. Doors:
  - a. Overall dimensions:  $\pm 3/64$ " maximum variation in width and length;  $\pm 1/16$ " variation in thickness.
  - b. Door squareness:  $\pm 1/16$ " variation in diagonal dimension.
  - c. Flatness:  $\pm 3/32$ " when measured with straight edge from corner to corner; each face.
3. Other tolerances: Indicated in S.D.I.-117-88.

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Verification of conditions: Verify openings and accessories are in correct position.

**3.02 INSTALLATION****A. Setting frames:**

1. General: Install in accord with S.D.I.-105-92, S.D.I.-110-84, and as follows.
2. Welded frames:
  - a. Set welded frames in position prior to beginning partition work. Brace frames until permanent anchors are set.
  - b. Set anchors for frames as construction activities progress. Install anchors at hinge and strike levels. Provide mortar guards at frame mortises in masonry walls.
  - c. Remove temporary braces and spreaders after wall construction is complete.
  - d. Fire-rated frames: Install in accord with requirements of NFPA 80-1995.
  - e. Install welded frames in prepared openings in concrete and masonry walls using countersunk bolts or expansion shields and anchors in accord with S.D.I.-111-F-91; fill or plug frame hole completely after doors and hardware are installed.

**B. Door installation:**

1. Install steel doors in frames, use hardware specified in Door Hardware Section.
2. Edge clearances at doors:
  - a. Between door and frame, at head and jambs:  $1/8$ ".
  - b. Meeting edges of door pairs and at mullions:  $1/8$ ".
  - c. Transom panels, without transom bars:  $1/8$ ".
  - d. Sills:
    - 1) Without thresholds:  $3/8$ " maximum above finish floor.
    - 2) With thresholds:  $3/4$ " maximum above finish floor.
3. Fire-rated doors: Install in accord with requirements of NFPA 80-1995.

**SECTION 08210 WOOD DOORS****PART 1 - GENERAL****1.01 WARRANTY**

**A. Special warranty:**

1. Doors:
  - a. Interior doors: Life of installation.
  - b. Causes for replacement:
    - 1) Delamination.
    - 2) NWWDA I.S. 1-A-93, T-1: Telegraphing of stile, rail, or core through face causing surface variation exceeding 1/100" in any 3" span.
    - 3) NWWDA I.S. 1-A-93, T-2: Warp or twist exceeding ¼" in door face plane.
2. Provide for finished replacement; include Project site refinishing, labor, and materials.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

**A. Acceptable manufacturers:**

1. Five ply flush doors:
  - a. Algoma Hardwoods, Inc.
  - b. Legacy (composition).
  - c. Eggers Industries, Inc.
  - d. Weyerhaeuser Company.
  - e. VT Industries, Inc.
2. Plastic laminate flush doors:
  - a. Algoma Hardwoods, Inc.
  - b. Buell Door Company.
  - c. Eggers Industries, Inc.
  - d. Oshkosh Architectural Door Company.
  - e. Weyerhaeuser Company.
  - f. VT Industries, Inc.
3. Stile and rail look doors: International Paper; Masonite Division Molded Products Group.

**2.02 MANUFACTURED UNITS**

**A. Flush doors:**

1. Solid core:
  - a. Type: NWWDA I.S. 1-A-93, Premium Grade.
  - b. Assembly, general:
    - 1) Wood veneer: NWWDA I.S. 1-A-93, PC-5; five-ply construction.
    - 2) Plastic laminate face: SLC-HPDL-5; five ply construction.
  - c. Core: ANSI A208.1, 1-LD-2 grade particleboard core.
  - d. Vertical and horizontal edges: Bonded to solid core; NWWDA T.M.6, Type II gluelines, minimum.
  - e. Adhesive: Commercial Standard CS-171, Type I for exterior and high moisture doors; Type II for other interior doors.
  - f. Blocking and reinforcement: No blocking required for TimberStrand® LSL or stave core doors. Provide particleboard core doors with solid wood blocking such as wide top rails and lock blocks for surface hardware such as closers and exit devices.
  - g. Stiles; bonded to core:
    - 1) Wood veneer: Matching hardwood 1-3/8" minimum two-ply.
    - 2) Plastic laminate face: Factory applied plastic laminate stiles laminated to manufacturer's standard construction hardwood; 1-3/8" minimum.
  - h. Rails, moldings, and trim; NWWDA I.S. 1-A-93, G-12: Hardwood rails or TimberStrand® LSL, 1-1/8" minimum.
  - i. Label: UL or WH 20 minute label on doors indicated to be 20 minute rated.

2. Mineral core:
    - a. Type: NWWDA I.S. 1-A-93, Custom Grade.
    - b. Assembly, general: NWWDA I.S. 1-A-93, FD-5 90 MIN, B label; FD-5 60 MIN, B label; FD-5 45 MIN, C label; or FD-5 20 MIN, 20 min. five ply construction; label requirements indicated on Drawings.
    - c. Core: Asbestos free mineral composition core; salt free.
    - d. Vertical and horizontal edges: Bonded to core; NWWDA T.M.6, Type II gluelines.
    - e. Adhesive: Commercial Standard CS-171, Type II.
    - f. Blocking, rails, and reinforcement; salt free:
      - 1) NWWDA I.S. 1-A-93: Provide lock blocks for scheduled locks. Provide blocking for other scheduled surface hardware attachment directly into blocking.
      - 2) Top and bottom rails 2" minimum before fitting, Georgia-Pacific Firestop® II high density mineral with 1130 lb. screw holding power minimum.
    - g. Stiles; salt free:
      - 1) 1¼" minimum before fitting, Georgia-Pacific Firestop® II high density mineral with 1130 lb. screw holding power minimum with
        - a) Wood veneer: veneer to match face veneer.
        - b) Plastic laminate face: factory applied plastic laminate.
      - 2) Bonded to core. Drill 5/32" pilot holes for hinge screws at factory prior to shipment for "B" and "C" label fire doors.
      - 3) Meet following performance criteria:
        - a) Split resistance; tested in accord with "Test Method to Determine Split Resistance of Hinge Edges of Composite Type Fire Doors": Average of ten test samples shall be not less than 900 load pounds.
        - b) Direct screw withdrawal; ASTM D1037-96a: Average of ten test samples shall be not less than 650 load pounds when tested for direct screw withdrawal using No. 12 x 1¼" steel thread-to-the-head wood screw of cadmium plated or rust-resistant type.
        - c) Cycle/Slam; ANSI A151.1, Section 2.5: 200,000 cycles with no loose hinge screws or other visible signs of failure.
    - h. Moldings, and trim; salt free; NWWDA I.S. 1-A-93, G-12: Fire-retardant treated maple or birch.
    - i. Core: Asbestos and salt free mineral composition core.
    - j. Labels: UL or WH factory applied labels for ratings indicated on Drawings in excess of 30 minute requirements allowed above in "Solid core" Subparagraph above.
  3. Doorskins:
    - a. Paint finish: Medium density overlay (MDO); overlay readily sandable, weatherproof, and carry a Class "B" Fire Rating.
    - b. Plastic laminate faces for HPDL:
      - 1) NEMA Standard LD-3.1-1991, Grade GP-50.
      - 2) Colors and patterns: Indicated on Drawings.
  4. Furnish astragals at meeting edge of door pair, wood beads, and applied moldings; same material and quality as door face; meet NWWDA Grade.
  5. Thickness: 1-3/4" thickness unless otherwise indicated.
- B. Stile and rail look doors:
1. Type: NWWDA I.S. 1-A-93, Grade II, Type II and AWI Section 1300, Custom Grade.
  2. Construction: Three-ply construction; low-density wood fiber core.
  3. Faces: International Paper; Masonite Division Molded Products Group; Craftmaster® Coventry® textured face molded four panel CraftCore® solid core.
  4. Thickness: 1-3/4".
  5. Label: UL or WH 20 minute label on solid core doors indicated to be 20 minute rated.

- C. Fire resistant glazing sealant, acceptable product: Rectorseal, Inc.; Metalcaulk Series for installation of wire glass in openings.

## 2.03 FABRICATION

### A. Shop assembly:

1. Fabricate doors to NWWDA I.S. 1-A-93, G-13 Workmanship and AWI Sections 1300 and 1400 as applicable for Grade specified and specified criteria. Generally, utilize hot press method for face lay up; bond stiles, rails, and faces to core material.
2. Fabrication details; use below unless otherwise indicated:
  - a. Meeting edge for door pairs:
    - 1) Non-rated and 20-minute doors: NWWDA I.S. 1-A-93, G-12, Option E4 Tee Astragal.
    - 2) Rated doors: NWWDA I.S. 1-A-93, G-12, Option E7 Metal Edge Guard Astragal.
  - b. Vision panel trimming:
    - 1) Non-rated and 20-minute doors: NWWDA I.S. 1-A-93, G-12, Option M3, Lip Molding for glazing, same rating as door.
    - 2) Rated doors: NWWDA I.S. 1-A-93, G-12, Option M4 Metal Vision Frame.
3. Cut and fit to sizes and supplied hardware templates prior to finishing.
4. Fabricate openings in labeled doors in accord with manufacturer's inspection service procedure and under label service; finish.
5. Seal edges and machined surfaces immediately after fitting and cutting.

### B. Tolerances:

1. Not prefit doors; width, height, and thickness:  $\pm 1/16"$ .
2. Machined for hardware:
  - a. Width:  $\pm 1/32"$ .
  - b. Height and thickness:  $\pm 1/16"$ .
  - c. Hardware location:  $\pm 1/32"$ .
  - d. Locks and hinges:  $+1/32" -0$ .
3. Prefit clearances:
  - a. Top and hinge edge:  $1/8"$ .
  - b. Single door lock edge:  $1/8"$ .
  - c. Pair meeting edge, per leaf:  $1/16"$ .
4. Squareness: Maximum  $1/8"$  difference in diagonal measurements.

## 2.04 SOURCE QUALITY CONTROL

### A. Inspection:

1. Allowable color and grade variation: Select doors for natural finish for uniformity in color and grain and inconspicuous joints in face veneers.
2. Adjacent doors and doors viewed together with color and grain meeting NWWDA standards specified above.

- B. Verification of performance: Stamp, brand, or label each door identifying manufacturer, trade association of which he is member, grade and type of door, or complying industry standard.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

**A. General:**

1. Install in accord with NWWDA I.S. 1-A-93, G-20, Care and Installation at Job Site.
2. Provide cutouts for door grilles and glass lights, without damage to door faces if not factory prepped. Field fabricated openings in rated doors are prohibited.
3. Machine doors for hardware using templates furnished by door hardware manufacturer, if not factory prepped.
4. Seal cut-outs immediately after cutting or machining with one coat of solvent type sealer.
5. Replace or rehang doors which bind or sag and doors with improper machining or cut-outs visible in finished construction activities.
6. Clean soil and smudge marks and handling defects from doors. Replace doors from which marks cannot be removed.
7. Install fire-rated doors in accord with requirements of NFPA 80-1995. Removing rating labels is prohibited.
8. Finishing paint grade veneers and edges: In accord with Paints Section.

**B. Tolerances:**

1. Variation from specified clearances:  $+1/32"$ ,  $-0$ .
2. Variation in edge alignment, pairs of doors, each leaf:  $1/16"$  maximum.
3. Clearances around door perimeter:
  - a. Hinge side:  $1/16"$ .
  - b. Latch edge:  $1/8"$  ( $+0"$ ,  $-1/16"$ ).
  - c. Meeting edges, pairs of doors:  $1/8"$  total.
  - d. Bottoms:  $1/4"$  above threshold or floor finish except where undercutting is indicated.

**SECTION 08310 ACCESS DOORS AND PANELS****PART 1 - GENERAL**

NOT USED

**PART 2 - PRODUCTS****2.01 MANUFACTURERS****A. Acceptable manufacturers:**

1. Products specified as standard of quality are manufactured by Karp Associates, Inc.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to compliance with specified requirements.
  - a. BAR-CO.
  - b. J. L. Industries.
  - c. Milcor, Inc.
  - d. Nystrom.
  - e. The Williams Brothers Corp.

**2.02 MANUFACTURED UNITS****A. Flush fire rated type for walls and ceilings; gypsum board beaded frame:**

1. Type: Karp Associates, Inc.; KRP-350FR, prime coated steel.
2. Materials:
  - a. Frame: 16-gauge steel, minimum with 1" minimum width flange.
  - b. Door: 20-gauge steel, minimum, welded pan type.
  - c. Hinges: Continuous piano hinge type.
  - d. 2" thickness rated insulation fill in door unit.
  - e. Latching: Flush key operated bolt type.



- f. Labels: Attach Label indicating classified rating for ceilings.
- 3. Finish: Baked on enamel.
- 4. Sizes: 12" by 12", unless otherwise indicated on Drawings.

B. Flush type for gypsum board walls and ceilings:

- 1. Type: Karp Associates, Inc.; KDW.
- 2. Materials:
  - a. Frame: 16-gauge steel, minimum with galvanized steel gypsum board bead.
  - b. Door: 14-gauge steel, minimum.
  - c. Hinges: Continuous piano hinge type.
  - d. Locking: Flush screwdriver operated with stainless steel cam and studs.
- 3. Finish: Baked on enamel primer.
- 4. Sizes: 10" by 10", unless otherwise indicated on Drawings.

2.03 ACCESSORIES

- A. Anchors, supports, and related items: Manufacturer's standard for installation to substrates.

**PART 3 - EXECUTION**

3.01 INSTALLATION

- A. Coordinate installation or furnish items for installation under other sections.

B. Access doors:

- 1. Install at locations indicated on Drawings, reviewed shop drawings, and required for access to equipment and valves in accord with manufacturer's installation instructions.
- 2. Fire-rated units: Install in accord with requirements of NFPA 80-1995.

**SECTION 08410 ALUMINUM ENTRANCES AND STOREFRONTS**

**PART 1 - GENERAL**

1.01 SYSTEM DESCRIPTION

A. Design requirements:

- 1. Design completed exterior system to withstand wind pressure loads, positive and negative, normal to wall plane for Category Classification, walls, corners, and heights indicated in accord with AAMA TIR-A10-1997; Table 1; Design Wind Load Tables psf (kPa).
- 2. Maximum allowable deflection; follow requirements of local code if more stringent: L/175 in any member when tested in accord with ASTM E330-84 with allowable stress safety factor of 1.65, minimum.
- 3. Provide for thermal movement caused by 180°F surface temperature range, without causing buckling stresses on glass, joint seal failure, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or detrimental effects.

B. Performance requirements for glazed storefronts systems framing without doors or operable walls:

- 1. Static pressure air infiltration: Completed storefronts systems shall have 0.06 CFM maximum allowable infiltration when tested in accord with ASTM E283-84 at 1.57 PSF differential static pressure.

2. Static pressure water infiltration: No uncontrolled water other than condensation on indoor face of any component when tested in accord with ASTM E331-86 at test pressure equal to 10% of positive wind-pressure design but not less than 6.24 PSF.
3. Contain water penetrating storefronts system within system by gutters; drain to exterior through weep holes. No uncontrolled water infiltration is allowable.

## 1.02 SUBMITTALS

### A. Shop drawings:

1. Indicate elevations; with sections and details at full scale. Include glass and metal thicknesses, joining details, field connections, anchorage, provisions for expansion, fastening and sealing methods, reinforcement, metal finishes, and glazing accessories. Indicate compliance with specified design criteria.
2. Shop drawings bearing professional engineer seal, licensed to practice in State of New Jersey.

### B. Quality control submittals:

1. Design data: Indicate compliance with criteria bearing professional engineer seal, licensed to practice in State of New Jersey.
2. Test reports: Certified copies of test reports on specified wall systems and components performance on request in lieu of conducting repeat tests.

## 1.03 QUALITY ASSURANCE

- ### A. Qualifications, installer:
- Completed five projects, minimum, of similar magnitude using systems similar to systems specified below in last three years. Furnish reference list of completed projects for review and verification.

## 1.04 WARRANTY

### A. Special warranty:

1. Door hardware: One year period.
2. Door closers: Additional four years beyond other hardware.
3. Warrant construction activities in this section for watertightness for two year period beginning at Date of Substantial Completion. Include corrective procedures at no additional cost during warranty period.
4. Coordinate warranty with construction activities specified in Glazing Section.
5. Coordinate and co-warranty with warranty requirements specified in Glazing Section.
6. Finish: Manufacturer's standard finish warranty.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

#### A. Acceptable manufacturers:

1. Products specified as standard of quality are indicated in MANUFACTURED UNITS Article.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to approval of product list and samples.

**B. Entrances and storefront systems:**

1. Arch Armalite.
2. EFCO Corp.
3. Kawneer Company, Inc.
4. Tubelite, Div. of Indal, Inc.
5. Vistawall Architectural Products.
6. YKK AP America Inc.

**C. Colored coating finish:**

1. Akzo Coatings.
2. Morton International, Specialty Coatings Group.
3. PPG Industries, Inc.
4. Valspar.

**2.02 MATERIALS**

**A. Extrusions: ASTM B221-90, 6063-T5 aluminum alloy.**

**B. Aluminum sheet: ASTM B209-90, 5005-H34 aluminum alloy, minimum 0.050" thickness.**

**C. Colored coating finish:**

1. Type: System for AAMA 605.2-92 application.
2. Colors: PPG Industries, Inc.; Interstate Green.
3. Color match touch-up finishes using Kynar or Hylar ADS PVDF formulation.

**D. Accessories:**

1. Fasteners:
  - a. Concealed: Zinc plated steel.
  - b. Exposed: Hardened aluminum alloys or AISI 300 series stainless steel; countersunk; match aluminum finish color.
2. Storefront sealant: Non-skinning type; AAMA 803.3-85, color matching finish.
3. Setting blocks, edge blocks, and spacers; ASTM C864-79; Shore durometer hardness as follows:
  - a. Setting blocks: 85  $\pm$ 5 Shore A durometer hardness.
  - b. Edge blocks: 65  $\pm$ 5 Shore A durometer hardness.
  - c. Spacers: 50  $\pm$ 5 Shore A durometer hardness.
4. Other items specified in respective component system.

**2.03 MANUFACTURED UNITS**

**A. Storefront framing system:**

1. System: YKK AP America Inc.; Series # YES 45F-T.
2. Framing characteristics:
  - a. System description: Center rabbet, exterior flush glazed; true thermally broken; jambs and vertical mullions continuous; head, sill, and intermediate horizontals attached by screw spline joinery.
  - b. Member size: 2" by 4-1/2".
  - c. Manufacturer's standard extruded aluminum expansion mullions, 90° corner posts, flexible corner posts, three way corner posts, entrance door framing, and indicated shapes.
  - d. Glazing: Indicated in Glazing Section.
  - e. Glazing pocket depth: Required for indicated glazing.
  - f. Glazing gaskets: Manufacturer's standard EPDM glazing gaskets for specified system.

**B. Entrances:**

1. Medium stile design:
  - a. Acceptable product: YKK AP America Inc.; # 35D.
  - b. Nominal dimensions: 3-1/2" wide stiles, 3-15/16" wide top rail, and 7-15/16" bottom rail; 1-3/4" depth.
2. Door construction: Fabricate using extruded aluminum sections with door corners joined by concealed reinforcement secured with bolts, screws, and sigma deep penetration welding.
3. Glazing stops:
  - a. Snap-in stops with EPDM glazing gaskets to prevent water infiltration; square style.
  - b. Provide for 1/4" glazing.
4. Doors with drip cap at head and bottom rail to prevent water infiltration.
5. Adjustment: Equip doors with adjustable mechanism located in top rail near lock stile to provide minor clearance adjustments after installation.
6. Weatherstripping: Manufacturer's standard pile type in replaceable rabbets for stiles and rails.

**C. Door hardware, each leaf:**

1. Offset pivots: One set YKK AP America Inc.; Standard Offset Pivot Package; and YKK AP America Inc.; Standard Intermediate Offset Pivot Package; clear finish. Furnish threshold clip.
2. Closers: YKK AP America Inc., Standard Heavy Duty Closer; concealed 105° w/o hold-open.
3. Other hardware specified in Door Hardware Section.

**2.04 FABRICATION****A. Shop assembly:**

1. Fabricate and assemble framing with joints only at intersections of members with uniform hairline connections; rigidly secure.
2. Drill and cut to template for hardware. Reinforce frames and door stiles and rails to receive hardware in accord with entrance manufacturer's product data.
3. Weld in accord with AWS recommendations or methods recommended by selected manufacturer. Conceal welds from view.

**B. Shop finishing: Prepare surfaces for specified finish; apply in accord with AAMA 605.2-92 requirements to obtain specified finish and uniform color.****C. Tolerances:**

1. Material cuts: Square to 1/32" off square, maximum, over largest dimension; proportionate amount of 1/32" on other two dimensions.
2. Maximum offset in alignment between two consecutive members in line, end to end: 1/64".
3. Maximum offset between framing members at glazing pocket corners: 1/64".
4. Joints between adjacent members in same assembly: Hairline and square to adjacent member.
5. Variation in squaring diagonals for doors and fabricated assemblies: 1/16".
6. Flatness for doors and fabricated assemblies:  $\pm 1/16$ " off neutral plane.

**2.05 SOURCE QUALITY CONTROL****A. Inspection: Inspect areas around welds; reject items showing welding bloom or discoloration on finish or material distortion.**

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## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of conditions: Verify locations of preset anchorages and block-outs have been installed in accord with reviewed shop drawings.

### **3.02 PREPARATION**

- A. Surface protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, and harmful surfaces.

### **3.03 INSTALLATION**

A. General:

1. Install entrances and storefronts systems in accord with manufacturer's product data and reviewed shop drawings, plumb, level, and true to line, within specified tolerances.
2. Protect aluminum in contact with masonry, steel, concrete, or dissimilar materials from contact using neoprene gaskets or apply mastic in accord with SSPC-Paint 12.
3. Shim and brace work plumb, level, and in designated location, before anchoring to structure.
4. Install sill flashing at exterior storefronts system. Extend flashing continuous with lapped joints; set in two continuous beads of butyl sealant full width.
5. Verify, during installation, storefronts system allows water entering system to be collected in gutters and weeped to exterior. Verify weep holes are open; and metal-to-metal joints are tightly sealed.
6. Locate expansion mullions where indicated on reviewed shop drawings.
7. Seal metal-to-metal storefronts system joints using storefront sealant. Install in accord with Joint Sealants Section; take care not to seal system weeps.

- B. Entrances: Install doors in frames for uniform contact, to operate throughout full swing without binding or sticking. Set thresholds in two continuous beads of butyl sealant full width of threshold.

- C. Sealants: Caulk juncture perimeter of system frame and adjoining material at jambs and head with sealant specified in Joint Sealants Section.

- D. Repair or replace work damaged or stained by subsequent construction activities. Clean exposed aluminum surfaces at completion of work and not more than 48 hours prior to Date of Substantial Completion in accord with finish manufacturer's recommendations.

E. Tolerances:

1. Material cuts: Square to 3/64" off square, maximum, over largest dimension; proportionate amount of 3/64" on other two dimensions.
2. Maximum variation from plumb, level, or designated position: 1/8" in 12'-0", not exceeding 1/4" in total run.
3. Maximum offset in alignment between two consecutive members in line, end to end: 1/16".
4. Maximum offset between framing members at glazing pocket corners: 1/32".
5. Joints between adjacent members in same assembly: Hairline and square to adjacent member.
6. Variation in squaring diagonals for assemblies: 1/8".

**SECTION 08461      AUTOMATIC SLIDING DOORS****PART 1 - GENERAL**

NOT USED

**PART 2 - PRODUCTS****2.01    MANUFACTURED UNITS**

A. Acceptable system: Stanley or equal.

B. Characteristics:

1. Door unit:
  - a. Model: See plans, Duraglide 3000.
  - b. Heavy duty extruded aluminum header and jambs with interlocked sections and thru-rod bolted connections; complete with doors, sidelights, and transom (where indicated).
2. Finish: Match storefront specified in Aluminum Entrances and Storefronts Section.
3. Equipment:
  - a. Electric operator with solid state controls, selector options, automatic recycle, 115V, 60 Hz.
  - b. Model 582 sensor control on approach side of each door, wire to operator.
4. Accessories:
  - a. Model 8120 safety beam.
  - b. Sliding door package labels indicating emergency exit.
  - c. Breakaway feature required in NFPA 101-94.
  - d. Electrical interlock to prevent operation when door is bolted or locked.
  - e. Limited access package: System #2 with card reader outside, automatic operation inside.
  - f. Adjustment: Top plate, accessible for maintenance; adjustable opening, closing, and checking speeds and unit switches.
  - g. Type: Concealed, overhead, self-contained, hydraulic, low pressure with separate cylinders for power and checking; emergency override for reversal operation.
  - h. Device in operator to keep door open for designated time after loss of signal from mat and then close.

**2.02    FABRICATION**

A. Shop assembly:

1. Fabricate and assemble framing with joints only at intersections of members with uniform hairline connections; rigidly secure.
2. Drill and cut to template for finish hardware. Reinforce frames and door stiles and rails to receive finish hardware in accord with door manufacturer's product data.
3. Weld in accord with AWS recommendations or methods recommended by selected manufacturer. Conceal welds from view.

B. Shop finishing: Prepare surfaces for specified finish; apply in accord with AAMA 605.2-92 requirements to obtain specified finish and uniform color.

C. Tolerances:

1. Material cuts: Square to  $1/32$ " off square, maximum, over largest dimension; proportionate amount of  $1/32$ " on other two dimensions.
2. Maximum offset in alignment between two consecutive members in line, end to end:  $1/64$ ".
3. Maximum offset between framing members at glazing pocket corners:  $1/64$ ".
4. Joints between adjacent members in same assembly: Hairline and square to adjacent member.
5. Variation in squaring diagonals for doors and other fabricated assemblies:  $1/16$ ".
6. Flatness for doors and other fabricated assemblies:  $\pm 1/16$ " off neutral plane.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. Verification of conditions: Verify locations of preset anchorages and block-outs have been installed in accord with reviewed shop drawings.

**3.02 PREPARATION**

- A. Surface protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, other harmful surfaces, and from careless handling, storage, or machining.

**3.03 INSTALLATION**

A. General:

1. Install automatic door equipment in accord with manufacturer's product data and reviewed shop drawings, plumb, level, and true to line, within specified tolerances.
2. Shim and brace work plumb, level, and in designated location, before anchoring to structure.
3. Install in frames for uniform contact, to operate throughout full cycle without binding or sticking.
4. Make electrical connections in accord with Division 16, Electrical.
5. Test completed assembly for correct operation.

B. Sealant:

1. Caulk perimeter of automatic door using sealant specified in Joint Sealants Section.
2. Set threshold units in double bead butyl sealant specified in Joint Sealants Section.

- C. Repair or replace work damaged or stained by subsequent construction activities. Clean exposed aluminum surfaces at work completion not more than 48 hours prior to Date of Substantial Completion in accord with finish manufacturer's recommendations.

D. Tolerances:

1. Material cuts: Square to  $3/64$ " off square, maximum, over largest dimension; proportionate amount of  $3/64$ " on other two dimensions.
2. Maximum variation from plumb, level, or designated position:  $1/8$ " in 12'-0", not exceeding  $1/4$ " in total run.
3. Maximum offset in alignment between two consecutive members in line, end to end:  $1/16$ ".
4. Maximum offset between framing members at glazing pocket corners:  $1/32$ ".
5. Joints between adjacent members in same assembly: Hairline and square to adjacent member.
6. Variation in squaring diagonals for assemblies:  $1/8$ ".

**SECTION 08520 ALUMINUM WINDOWS****PART 1 - GENERAL**

NOT USED

**PART 2 - PRODUCTS****2.01 MANUFACTURERS****A. Acceptable manufacturers:**

1. Products specified as standard of quality are indicated in MATERIALS Article.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to approval of product list and samples.
  - a. Quaker Windows and Doors
  - b. Acorn Building Components, Inc.
  - c. Alenco, Division of Redman Industries, Inc.
  - d. EFCO Corp.
  - e. Milco Division, Wausau Metals Corp.
  - f. TRACO, Three Rivers Aluminum Company.
  - g. Tri-State Glass & Aluminum Services.

**B. Configurations: Horizontal sliders and fixed sash with integral louvers for PTAC units.****2.02 MATERIALS****A. Extrusions: ASTM B221-90, 6063-T5 aluminum alloy.****B. Aluminum sheet: ASTM B209-90, 5005-H34 aluminum alloy, minimum 0.050" thickness.****C. Colored coating finish:**

1. Characteristics: System for AAMA 605.2-92 application.
2. Colors: Match storefront color; PPG Industries, Inc.; Interstate Green.
3. Color match touch-up finishes using Kynar or Hylar ADS PVDF formulation.

**D. Accessories:**

1. Fasteners: Hardened aluminum alloys or AISI 300 series stainless steel; countersink exposed fasteners; match window color.
2. Storefront sealant: Non-skinning type; AAMA 803.3-85, color to match windows.
3. Setting blocks, edge blocks, and spacers: Specified in Glazing Section.
4. Other materials for installation.

**2.03 MANUFACTURED UNITS****A. Horizontal sliding windows:**

1. Type: AAMA Designation HS-C35, horizontal sliding windows, actual rating may vary with local code; follow more stringent requirements.
2. Material: ASTM B221-90 aluminum alloy, 0.062" wall thickness, minimum, for frame sill; 0.078" wall thickness, minimum, for other members.
3. Construction: Interlocking and sealed for weather tightness; weep bottom rail for water drainage.
4. Hardware: Tandem brass rollers, four per sash, minimum for rolling sash; manufacturer's standard self-locking latch device.



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5. Weatherstripping: Wool pile, dense polypropylene, neoprene, or vinyl, continuous around operating sash.
6. Glazing provisions: Extruded aluminum and vinyl glazing beads.
7. Provide manufacturer's standard vandal-resistant stop limiting window opening to 4".
8. Ground floor guest rooms and guest rooms with balconies: Provide "Charley Bar" and warning notification and instructions for using security devices.
9. Glazing: Insulated; specified in Glazing Section.

**B. Fixed windows:**

1. Type: AAMA Designation F-C35, 1-1/2" deep, fixed sash; configurations indicated, actual rating may vary with local code; follow more stringent requirements.
2. Material: ASTM B221-90, aluminum alloy; 0.062" wall thickness, minimum, for frame sill; 0.078" wall thickness, minimum, for other members.
3. Construction: Mitered and flash welded tubular members.
4. Weatherstripping: Continuous neoprene at interior and exterior weathering contacts set in dovetail grooves in sash.
5. Glazing: Insulated; specified in Glazing Section.

**2.04 FABRICATION**

**A. Shop assembly:**

1. Fabricate and assemble framing with joints at intersections of members with uniform hairline connections; rigidly secure.
2. Reinforce frames to receive finish hardware in accord with door manufacturer's product data.
3. Weld in accord with AWS recommendations or methods recommended by selected manufacturer. Conceal welds from view.

**B. Shop finishing:** Prepare surfaces for specified finish; apply in accord with AAMA 605.2-92 requirements to obtain specified finish and uniform color.

**C. Tolerances:**

1. Material cuts: Square to 1/32" off square, maximum, over largest dimension; proportionate amount of 1/32" on other two dimensions.
2. Maximum offset in alignment between two consecutive members in line, end to end: 1/64".
3. Maximum offset between framing members at glazing pocket corners: 1/64".
4. Joints between adjacent members in same assembly: Hairline and square to adjacent member.
5. Variation in squaring diagonals for windows: 1/16".
6. Flatness for windows:  $\pm 1/16$ " off neutral plane.

**2.05 SOURCE QUALITY CONTROL**

**A. Inspection:** Inspect areas around welds; reject items showing welding bloom or discoloration on finish or material distortion.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

**A. Verification of conditions:** Verify rough openings are sized within tolerances.

### 3.02 PREPARATION

- A. Surface protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, harmful surfaces, and careless handling.

### 3.03 INSTALLATION

A. General:

1. Install window assemblies in accord with manufacturer's product data and reviewed shop drawings plumb, level, and true to line, within specified tolerances; do not penetrate sill pan.
2. Protect metal in contact with masonry, steel, concrete, or other dissimilar material from contact by neoprene gaskets or bituminous coating.
3. Shim and brace work plumb, level, and in designated location before anchoring window frame members to structure.
4. Caulk perimeter of window assemblies, interior and exterior, at interface with adjacent work; use sealant specified in Joint Sealants Section.

B. Tolerances:

1. Maximum variation from plumb, level, or designated position: 1/8" in 12'-0", not exceeding 1/4" in total run.
2. Variation in squaring diagonals for assemblies: 1/8".

### 3.04 CLEANING

- A. Remove and replace broken, chipped, cracked, or damaged glass not more than 48 hours prior to Date of Substantial Completion.
- B. Wash and polish glazing materials on both faces following construction activities and not more than 48 hours prior to Date of Substantial Completion. Clean exterior and interior metal surfaces in accord with window manufacturer's cleaning instructions at same time.
- C. Repair or replace work damaged or stained by subsequent construction activities. Clean exposed aluminum surfaces at work completion and not more than 48 hours prior to Date of Substantial Completion in accord with finish manufacturer's recommendations.

## **SECTION 08710 DOOR HARDWARE**

### **PART 1 - GENERAL**

#### 1.01 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following:
1. Hinges
  2. Key control system
  3. Lock and latch sets
  4. Exit devices
  5. Push/Pull units
  6. Closers

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7. Overhead holders
8. Miscellaneous door control devices
9. Door trim units
10. Protection plates
11. Weatherstripping for exterior doors
12. Astragals or meeting seals on pairs of doors
13. Thresholds

C. **Related Sections:** The following Sections contain requirements that relate to this Section:

1. Section 08110: Steel Doors and Frames
2. Section 08210: Wood Doors
3. Section 08410: Aluminum Entrances and Storefronts
4. Section 08720: Guestroom Locking Systems
5. Division 16: Electrical

## 1.02 REFERENCES

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
6. Warnock Hersey

B. Regulatory standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336 (ADA).
2. CABO/ANSI A117.1: Providing Accessibility and Usability for Physically Handicap People, 1992 edition.

## 1.03 SYSTEM DESCRIPTION

A. Refer to applicable Headings for system description for electric and electro-pneumatic hardware products.

## 1.04 SUBMITTALS

A. **General:** Submit the following in accordance with Conditions of Contract and Division 1 Specification sections:

B. **Product data** including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.

- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format "hardware sets" indicating complete designations of every item required for each door or opening. Use specification Heading numbers with any variations suffixed a, b, etc. Include the following information:
    - a. Type, style, function, size, and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
    - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for hardware.
    - g. Door and frame sizes and materials.
    - h. Keying information.
    - i. Cross reference numbers used within schedule deviating from those specified.
      - 1) Column 1: State specified item and manufacturer.
      - 2) Column 2: State prior approved substituted item and its manufacturer.
  - 2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
  - 3. Submittal Sequence: Submit initial draft of final schedule along with essential product data in order to facilitate the fabrication of other work that is critical in the Project construction schedule. Submit final schedule after samples, product data, coordinate with shop drawings of other work, delivery schedules, and similar information has been completed and accepted.
  - 4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- D. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.
  - 1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
- E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- F. Contract closeout submittals:
  - 1. Operation and maintenance data: Complete information for installed door hardware.
  - 2. Warranty: Completed and executed warranty forms.

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## 1.05 QUALITY ASSURANCE

- A. **Single Source Responsibility:** Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. **Supplier Qualifications:** A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the work, for consultation.
  - 1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
  - 2. Required supplier to meet with installer prior to beginning of installation of door hardware.
- C. **Fire-Rated Openings:** Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

## 1.06 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

## 1.07 WARRANTY

- A. **Special warranties:**
  - 1. Door Closers: Ten-year period
  - 2. Exit Devices: Three-year period

## 1.08 MAINTENANCE

- A. **Maintenance Tools and Instructions:** Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. **Parts kits:** Furnish manufacturers' standard parts kits for locksets, exit devices, and door closers.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURED UNITS

- A. **Hinges:**
  - 1. **Acceptable manufacturers:**
    - a. Hager Hinge Company
    - b. Lawrence Brothers
    - c. Stanley Works
    - d. Mont Hard\*
  - 2. **Characteristics:**
    - a. **Templates:** Provide only template-produced units.
    - b. **Screws:** Provide Phillips flat-head screws complying with the following requirements:
      - 1) For metal doors and frames install machine screws into drilled and tapped holes.
      - 2) For wood doors and frames install threaded-to-the-head wood screws.
      - 3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
      - 4) Finish screw heads to match surface of hinges or pivots.
  - c. **Hinge pins:** Except as otherwise indicated, provide hinge pins as follows:
    - 1) Out-Swing Exterior Doors: Non-removable pins.
    - 2) Out-Swing Corridor Doors with Locks: Non-removable pins.
    - 3) Interior Doors: Non-rising pins.
    - 4) Tips: Flat button and matching plug. Finished to match leafs.
  - d. **Size:** Size hinges in accordance with specified manufacturer's published recommendations.
  - e. **Quantity:** Furnish one pair of hinges for all doors up to 5'0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof.
- B. **Cylinders:**
  - 1. **Acceptable manufacturers:**
    - a. Schlage Lock Co., Division of Ingersoll-Rand\*
    - b. Russwin/Corbin
    - c. Sargent
  - 2. **Characteristics:**
    - a. Grandmaster key or master key to a new master key system.
    - b. Equip locks with manufacturer's special 6-pin tumbler cylinder with construction master key feature that permits voiding of construction keys without cylinder removal.
    - c. **Metals:** Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

- d. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
  - 1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
- e. Key Material: Provide keys of nickel silver only.
- f. Key Quantity: Furnish 2 change keys for each lock, 4 master keys for each master system, and 4 grandmaster keys for each grandmaster system, and 6 construction master keys.
  - 1) Furnish one extra blank for each lock.

C. Locksets, Latch sets:

- 1. Acceptable manufacturers:
  - a. Schlage Lock Company\*
  - b. Russwin/Corbin
  - c. Sargent
- 2. Characteristics:
  - a. Locksets and Latch sets to be UL Listed standard duty cylindrical type, 2-3/4" backset.
  - b. Provide appropriate strikes, with lip to center dimensions required with wrought strike boxes.
  - c. Lock series and trim to be Schlage AL, Lever Neptune.

D. Exit Devices:

- 1. Acceptable manufacturers:
  - a. Von Duprin, Division of Ingersoll-Rand\*
- 2. Characteristics:
  - a. Exit devices shall be "UL" listed for life safety. All exit devices for fire rated openings shall have "UL" labels for "Fire Exit Hardware."
  - b. All exit devices mounted on labeled wood doors shall be thru-bolted mounted on the door per the door manufacturers requirements.
  - c. All trim shall be thru-bolted to the lock stile case.
  - d. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, plated to the standard architectural finishes to match the balance of the door hardware. Painted or anodized aluminum finishes are not accepted.
  - e. Provide glass bead conversion kits to shim exit devices on doors with raised glass heads.
  - f. All exit devices shall be one manufacturer.
  - g. All series exit devices shall incorporate a fluid damper, which decelerates the touchpad on its return stroke and eliminates noise associated with exit device operation. All exit devices shall be non-handed. Touchpad shall extend a minimum of 1/2 of the door width and shall be a minimum of 2-3/16" in height. Plastic touchpads are not acceptable. All latch bolts to be the deadlocking type. Latch bolts shall have a self-lubricating coating to reduce wear. Plated or plastic coated latch bolts are not acceptable.

E. Closers and Door Control Devices:

- 1. Acceptable manufacturers:
  - a. LCN Closers, Division of Ingersoll-Rand

2. Characteristics:

- a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.
- b. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F (49 degrees C) to -30 degrees F (-35 degrees C).
- c. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
- d. All closers shall have solid forged steel main arms (and forearms for parallel arm closers) and where specified shall have a cast-in solid stop on the closer shoe ("cush"). Where door travel on out-swing doors must be limited, use "cush" type closers. Auxiliary stops are not required when cushion type closers are used.
- e. Overhead concealed closers shall have spring power adjustable for 50% increase in closing power and fully mortised door tracks.
- f. All closers shall be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers (overhead, surface and concealed) shall be of one manufacturer and carry manufacturer's ten-year warranty (electric closers to have two year warranty).
- g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped. Provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
- h. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.
- i. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.
- j. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage and to release and automatically close door under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts. Where Combination Door Closers, Holder, and Detectors are scheduled, provide integral UL Listed photoelectric 24V detector module.

F. Overhead Door Holders:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson, Division of Ingersoll-Rand\*
  - b. Rixson Firemark
- 2. Characteristics:
  - a. Provide heavy duty and medium duty door holders concealed and surface mounted of brass, bronze or stainless steel.
  - b. Concealed holders to be installed with the jamb bracket mortised flush with the bottom of the jamb. The arm and channel to be mortised into the door.
  - c. Holder to be installed with the jamb bracket mounted on the stop.

G. Floor Stops and Wall Bumpers:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson



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- b. Ives
- c. Rockwood Manufacturing\*
- 2. Characteristics: Refer to Hardware Headings.

H. Push Plates:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson
  - b. Ives
  - c. Rockwood Manufacturing\*
- 2. Characteristics:
  - a. Exposed Fasteners: Provide manufacturers standard exposed fasteners.
  - b. Material to be bronze, per the Hardware Headings.
  - c. Provide plated sized as shown in Hardware Headings.

I. Door Pulls & Pull Plates:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson
  - b. Ives
  - c. Rockwood Manufacturing\*
- 2. Characteristics:
  - a. Provide concealed thru-bolted trim on back-to-back mounted pulls, but not for single units.
  - b. Material to be bronze.
  - c. Provide units sized as shown in Hardware Headings.

J. Push Pull Sets:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson
  - b. Ives
  - c. Rockwood Manufacturing\*
- 2. Characteristics:
  - a. Provide mounting systems as shown in hardware sets.
  - b. Material to be tubular, bronze.
  - c. Provide Push/Pull sets sized as shown in Hardware Headings.

K. Protective Plates:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson
  - b. Ives
  - c. Rockwood Manufacturing\*
- 2. Characteristics:
  - a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
  - b. Materials:
    - 1) Metal Plates: Bronze, .062 inch (U.S. 16 gage)
  - c. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side.

- d. Heights:
  - 1) Kick plates to be 10 inches in height.
  - 2) Armor plates to be 36 inches in height.

L. Thresholds:

- 1. Acceptable manufacturers:
  - a. National Guard Products, Inc.\*
  - b. Reese Industries
  - c. Zero Weatherstripping Co., Inc.
- 2. Types: Indicated in Hardware Headings.

M. Weatherstripping:

- 1. Acceptable manufacturers:
  - a. National Guard Products, Inc.\*
  - b. Reese Industries
  - c. Zero Weatherstripping Co., Inc.
- 2. Types: Indicated in Hardware Headings.

N. Silencers:

- 1. Acceptable manufacturers:
  - a. Glynn Johnson
  - b. Ives
  - c. Rockwood Manufacturing\*
- 2. Three for each single doors; four for pairs of doors.

## 2.02 MATERIALS AND FABRICATION

- A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.
  - 1. Manufacturer's identification will be permitted on rim of lock cylinders only.
- B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
  - 1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
  - 2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of adequately fastening the hardware. Coordinate with wood doors and metal doors and frames where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

## **2.03 HARDWARE FINISHES**

- A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.
- C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."
- E. Finish to be US4 (606) Satin Brass unless noted otherwise in the Hardware Schedule. Hinges and concealed door closers are to be plated to match. Surface mounted door closers are to be Powder Coat Paint to match.

## **PART 3 - EXECUTION**

### **1. INSTALLATION**

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
  - i. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
  - ii. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."
- F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

### 3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
  - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Door Hardware Supplier's Field Service
  - 1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
  - 2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
  - 3. File written report of this inspection to Architect.
- D. Prior to project completion, a representative of the overhead closer manufacturer shall inspect and adjust all closers and certify that all closers are installed in accordance with the manufacturer's instructions, and are regulated properly and functioning correctly. A written report shall be provided to the Architect as to the inspection and shall include appropriate certificates.

### 3.03 HARDWARE SCHEDULE

| <b>HARDWARE SET #1</b>                                                                                                                                                          |  |                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------|
| <b>DOORS:</b>                                                                                                                                                                   |  | <b>EXTERIOR TO VESTIBULE</b> |
| <b>EACH SLIDING PAIR TO HAVE: THRESHHOLD</b>                                                                                                                                    |  |                              |
| NOTES: 1) ALL HARDWARE BY SLIDING DOOR MANUFACTURER.<br>2) FINISH TO MATCH SLIDING DOORS.<br>3) COORDINATE SECURITY HARDWARE WITH GUESTROOM ENTRY SYSTEM AND ELECTRICAL SYSTEM. |  |                              |

**HARDWARE SET #2**

|                                       |  |                    |
|---------------------------------------|--|--------------------|
| DOORS:                                |  | VESTIBULE TO LOBBY |
| EACH SLIDING PAIR TO HAVE: THRESHHOLD |  |                    |

- NOTES: 1) ALL HARDWARE BY SLIDING DOOR MANUFACTURER.  
 2) FINISH TO MATCH SLIDING DOORS.  
 3) COORDINATE SECURITY HARDWARE WITH GUESTROOM ENTRY SYSTEM AND ELECTRICAL SYSTEM.  
 4) WITH ELECTRIC STRIKE OPERATION

**HARDWARE SET #3**

|                    |  |                                   |
|--------------------|--|-----------------------------------|
| DOORS:             |  | MECHANICAL OR STORAGE TO EXTERIOR |
| EACH DOOR TO HAVE: |  |                                   |

|  |     |                  |           |
|--|-----|------------------|-----------|
|  | 1 ½ | PAIR HINGES      | BB991 NRP |
|  | 1   | LOCKSET          | AL80PD    |
|  | 1   | CLOSER           | 1461-CUSH |
|  | 1   | THRESHOLD        | 896NBR    |
|  | 1   | SET DOOR SEALS   | 5050      |
|  | 1   | DOOR BOTTOM SEAL | C627A     |

NOTE: SPLIT FINISH – US 4 ON EXTERIOR, US26D ROOM SIDE

**HARDWARE SET #4**

|                    |  |                   |
|--------------------|--|-------------------|
| DOORS:             |  | STAIR TO EXTERIOR |
| EACH DOOR TO HAVE: |  |                   |

|  |     |                  |           |
|--|-----|------------------|-----------|
|  | 1 ½ | PAIR HINGES      | BB991 NRP |
|  | 1   | EXIT DEVICE      | 99L-F     |
|  | 1   | EXIT STRIKE      | 6111      |
|  | 1   | POWER SUPPLY     | PS 861    |
|  | 1   | CYLINDER         | 20-000    |
|  | 1   | CLOSER           | 1461-CUSH |
|  | 1   | KICK PLATE       | 1000      |
|  | 1   | THRESHOLD        | 896NBR    |
|  | 1   | SET DOOR SEALS   | 5050      |
|  | 1   | DOOR BOTTOM SEAL | C627A     |

NOTE: COORDINATE SECURITY HARDWARE WITH GUESTROOM ENTRY SYSTEM READER

**HARDWARE SET #5**

|                    |     |                               |        |
|--------------------|-----|-------------------------------|--------|
| DOORS:             |     | MENS, WOMENS TOILETS (PUBLIC) |        |
| EACH DOOR TO HAVE: |     |                               |        |
|                    | 1 ½ | PAIR HINGES                   | BB1079 |
|                    | 1   | PRIVACY SET                   | AL40S  |
|                    | 1   | CLOSER                        | 1461   |
|                    | 1   | KICK PLATE                    | 1000   |
|                    | 1   | MOP PLATE                     | 1000   |
|                    | 1   | WALL BUMPER                   | 60W    |
|                    | 1   | SET DOOR SEALS                | 2525   |

**HARDWARE SET #6**

|                    |     |                            |           |
|--------------------|-----|----------------------------|-----------|
| DOORS:             |     | CORRIDOR TO MECH & LAUNDRY |           |
| EACH DOOR TO HAVE: |     |                            |           |
|                    | 1 ½ | PAIR HINGES                | BB1079    |
|                    | 1   | CYLINDER                   | 20-000    |
|                    | 1   | PUSH/PULL LOCK             | GJ HL9070 |
|                    | 1   | CLOSER                     | 1461      |
|                    | 1   | KICK PLATE                 | 1000      |
|                    | 1   | WALL BUMPER                | W60       |

NOTE: SPLIT FINISH – US4 PUBLIC SIDE, US26D/32D SERVICE SIDE

**HARDWARE SET #7**

|                    |     |                                    |        |
|--------------------|-----|------------------------------------|--------|
| DOORS:             |     | REGISTRATION, BREAK ROOM & LAUNDRY |        |
| EACH DOOR TO HAVE: |     |                                    |        |
|                    | 1 ½ | PAIR HINGES                        | BB1079 |
|                    | 1   | LOCKSET                            | AL70PD |
|                    | 1   | CLOSER                             | 1461   |
|                    | 1   | KICK PLATE                         | 1000   |
|                    | 1   | WALL BUMPER                        | W60    |

**HARDWARE SET #8**

|                    |     |                                   |          |
|--------------------|-----|-----------------------------------|----------|
| DOORS:             |     | ELEV. EQUIPMT & LAUNDRY TO DRYERS |          |
| EACH DOOR TO HAVE: |     |                                   |          |
|                    | 1 ½ | PAIR HINGES                       | BB1079   |
|                    | 1   | LOCKSET                           | AL80PD   |
|                    | 1   | CLOSER                            | 1461-EDA |
|                    | 1   | SET DOOR SEALS                    | 2525     |
|                    | 1   | DOOR BOTTOM SEAL                  | 220SB    |
|                    | 1   | WALL BUMPER                       | W60      |

**HARDWARE SET #9**

|                    |     |                |                                |
|--------------------|-----|----------------|--------------------------------|
| DOOR:              |     | FITNESS CENTER |                                |
| EACH DOOR TO HAVE: |     |                |                                |
|                    | 1 ½ | PAIR HINGES    | BB1079                         |
|                    | 1   | LOCKSET        | AL70PD                         |
|                    | 1   | LOCKSET        | See Guestroom locking systems. |
|                    | 1   | CLOSER         |                                |
|                    | 1   | KICK PLATE     | 1000                           |
|                    | 1   | WALL BUMPER    | W60                            |

**HARDWARE SET #10**

|                    |     |                 |                                |
|--------------------|-----|-----------------|--------------------------------|
| DOORS:             |     | SALES, CUPBOARD |                                |
| EACH DOOR TO HAVE: |     |                 |                                |
|                    | 1 ½ | PAIR HINGES     | BB1079                         |
|                    | 1   | LOCKSET         | AL70PD                         |
|                    | 1   | LOCKSET         | See Guestroom locking systems. |
|                    | 1   | CLOSER          | 1461                           |
|                    | 1   | KICK PLATE      | 1000                           |
|                    | 1   | WALL BUMPER     | W60                            |

**HARDWARE SET #11**

|                    |   |                       |        |
|--------------------|---|-----------------------|--------|
| DOORS:             |   | BUSINESS              |        |
| EACH DOOR TO HAVE: |   |                       |        |
|                    | 3 | PAIR HINGES           | BB1079 |
|                    | 2 | LATCH SET             | 592    |
|                    | 2 | SETS DUMMY TRIM       | AL172  |
|                    | 2 | FLOOR STOPS & HOLDERS | 491    |

**HARDWARE SET #12**

|                    |     |                   |        |
|--------------------|-----|-------------------|--------|
| DOORS:             |     | CORRIDOR TO STAIR |        |
| EACH DOOR TO HAVE: |     |                   |        |
|                    | 1 ½ | PAIR HINGES       | BB1079 |
|                    | 1   | PASSAGE SET       | AL10PD |
|                    | 1   | CLOSER            | 1461   |
|                    | 1   | KICK PLATE        | 1000   |
|                    | 1   | FLOOR STOP        | FB     |
|                    | 1   | SET DOOR SEALS    | 2525   |
|                    | 1   | DOOR BOTTOM SEAL  | 600B   |
|                    |     |                   |        |

|  |  |  |  |
|--|--|--|--|
|  |  |  |  |
|--|--|--|--|

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### HARDWARE SET #13

|                    |     |                               |        |
|--------------------|-----|-------------------------------|--------|
| DOORS:             |     | TELEVIDEO/STORAGE ROOMS/MAINT |        |
| EACH DOOR TO HAVE: |     |                               |        |
|                    | 1 ½ | PAIR HINGES                   | BB1079 |
|                    | 1   | LOCKSET                       | AL80PD |
|                    | 1   | CLOSER                        | 1461   |
|                    | 1   | KICK PLATE                    | 1000   |
|                    | 1   | WALL BUMPER                   | W60    |

NOTE: SPLIT FINISH – US4 CORRIDOR, US26D/32D ROOM SIDE

### HARDWARE SET #14

|                    |     |                      |        |
|--------------------|-----|----------------------|--------|
| DOORS:             |     | ELECTRICAL EQUIPMENT |        |
| EACH DOOR TO HAVE: |     |                      |        |
|                    | 1 ½ | PAIR HINGES          | BB1079 |
|                    | 1   | LOCKSET              | AL70PD |
|                    | 1   | CLOSER               | 1461   |
|                    | 1   | KICK PLATE           | 1000   |
|                    | 1   | WALL BUMPER          | W60    |

### HARDWARE SET #15

|                    |     |                  |                          |
|--------------------|-----|------------------|--------------------------|
| DOOR:              |     | GUESTROOM ENTRY  |                          |
| EACH DOOR TO HAVE: |     |                  |                          |
|                    | 1 ½ | PAIR HINGES      | BB1079                   |
|                    | 1   | LOCKSET          | Guestroom locking system |
|                    | 1   | CLOSER           | 1371                     |
|                    | 1   | DOOR VIEWER      | 622                      |
|                    | 1   | DOOR GUARD       | 604 X 605 EDGE GUARD     |
|                    | 1   | WALL BUMPER      | W60                      |
|                    | 1   | THRESHOLD        | By Carpet Manufacturer   |
|                    | 1   | SET DOOR SEALS   | 2525                     |
|                    | 1   | BOTTOM DOOR SEAL | 600B                     |

NOTE: PROVIDE 2 DOOR VIEWERS AT ADA GUESTROOMS, ONE (1) @5'-0" AFF & ONE (1) @ 36" AFF



**HARDWARE SET #16**

|                                                                                                                                                                          |     |                 |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------|---------|
| DOOR:                                                                                                                                                                    |     | GUESTROOM BATH  |         |
| EACH DOOR TO HAVE:                                                                                                                                                       |     |                 |         |
|                                                                                                                                                                          | 1 ½ | PAIR HINGES     | 1379    |
|                                                                                                                                                                          | 1   | PRIVACY SET     | AL40S   |
|                                                                                                                                                                          | 1   | OVERHEAD HOLDER | GJ 450S |
|                                                                                                                                                                          | 1   | DOOR BUMPER     | W60     |
| NOTES: 1.) OVERHEAD HOLDER AT ADA UNITS ONLY.<br>1. DOOR BUMPER - INSTALL ON BACK OF DOOR WHERE DOOR STRIKES TUB.<br>2. SPLIT FINISH – US4 ROOM SIDE, US26 AT BATH SIDE. |     |                 |         |

**HARDWARE SET #17**

|                    |   |                      |        |
|--------------------|---|----------------------|--------|
| DOOR:              |   | CONNECTING DOORS     |        |
| EACH DOOR TO HAVE: |   |                      |        |
|                    | 3 | PAIR HINGES          | 1079   |
|                    | 2 | EXIT LOCKS           | AL25D  |
|                    | 2 | DOOR BOLTS           | B180N  |
|                    | 2 | WALL BUMPER          | W60    |
|                    | 1 | THRESHOLD            | 409DKB |
|                    | 2 | SET DOOR SEALS       | 2525   |
|                    | 2 | DOOR BOTTOM<br>SEALS | 220SB  |

**HARDWARE SET #18**

|                    |   |                   |        |
|--------------------|---|-------------------|--------|
| DOOR:              |   | GUESTROOM CLOSETS |        |
| EACH DOOR TO HAVE: |   |                   |        |
|                    | 3 | PAIR HINGES       | 1379   |
|                    | 1 | DOORBUMPER        | W60    |
|                    | 1 | PASSAGE SET       | AL10PD |
|                    |   |                   |        |

**SECTION 08720 GUESTROOM LOCKING SYSTEMS****PART 1 - GENERAL****1.01 SUMMARY****A. Section includes:**

1. Furnishing and installing hard-wired stand-alone card readers to provide a complete guestroom locking system.
2. Items commonly known as Door Hardware are provided under Section 08710.

**B. Related sections:**

1. Section 08110: Steel Doors and Frames
2. Section 08210: Wood Door
3. Section 08710: Door Hardware
4. Division 16: Electrical

**1.02 REFERENCES****A. Standards of the following as referenced:**

1. American National Standards Institute (ANSI)
2. Builders Hardware Manufacturers Association (BHMA)
3. Door and Hardware Institute (DHI)
4. Factory Mutual (FM)
5. National Fire Protection Association (NFPA)
6. Underwriters' Laboratories, Inc. (UL)

**B. Industry standards of the following as referenced:**

1. Department of Justice, Office of the Attorney General, Americans with Disabilities Act, Public Law 101-336, (ADA).
2. ANSI A117.1: Providing Accessibility and Usability for Physically Handicapped People, 1986 edition.
3. Federal Register Part III, Department of Justice, Office of the Attorney General, 28 CFR Part 36: Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities; Final Rule, July 26, 1991.
4. Federal Register Part II, Architectural and Transportation Barriers Compliance Board, 36 CFR Part 1191: Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Amendment to Final Guidelines, September 6, 1991.

**1.03 SYSTEM DESCRIPTION****A. Furnish and install wall readers, complete without limitation, the following components:**

1. Lock units
2. Special tools
3. Operating manuals
4. Provide wiring schematics showing conduit runs number and size of conductors, junction box locations (height above finish floor), for coordination with electrical contractor

**1.04 SUBMITTALS****A. Shop drawings:**

1. Provide complete shop drawings and all electrical requirements.
2. Templates: After approval of shop drawings, furnish lock templates to door and frame manufacturers for fabrication use.

**B. Samples: Each item type, if requested by Architect. Samples will be returned to supplier. Tag samples with opening identification.**

C. Quality control submittals:

1. Manufacturer's field reports: File report indicated in FIELD QUALITY CONTROL Article below.

D. Contract closeout submittals:

1. Operation and maintenance date: Complete information for locking system.
2. Warranty: Completed and executed warranty forms.
3. As-built wiring diagrams for hard-wired electrical components.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer shall have had experience in the installing and servicing of electronic lock systems and shall be approved by the manufacturer of the system.

B. Regulatory requirements:

1. Furnish locksets for fire-rated openings in compliance with requirements of NFPA 80-1990 and NFPA 101-1991.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. System components, including locksets must be stored in dry temperature controlled environment

1.07 WARRANTY

A. Special warranty:

1. Card readers and other electrical equipment: Two (2) years.

**PART 2 - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to full compliance with requirements, provide electronic lock system by one of the following manufacturers:

1. Tesa HT24 Lock System - Basis of Design
2. Ving
3. Safelock

- B. Where door rail size and construction dictate, provide locks with narrow backset to fit into narrow rails.

- C. Substitution: If a qualified bidder proposes to furnish material of other manufacturers, he must receive prior approval by the architect and submit the manufacturer's name, catalog information and an explanation for the substitution no later than fifteen (15) working days, prior to the bidding to the general contractor. The architect (upon examination of the catalog information for proposed substitution) will issue an addendum to the specification if he considers the proposed substitution to be equivalent to the material specified. If no addendum is issued, it is understood that the bidder will supply the hardware exactly as specified.

## 2.02 WALL READER

- A. Wall reader and verifier shall be individual and time specific and retain memory of last 1,000 entries. Provide on-line power with battery back up. Wall readers shall be able to automatically lock and unlock at predetermined times determined by owner.

## 2.03 SECURITY HARDWARE

- A. Acceptable manufacturers:
  - 1. Von Duprin\*
  - 2. Locknetics Security Engineering
- B. Provide narrow-line electromagnetic locks with 1200 lbs holding force. Power supply to have low voltage DC regulated filtered power supply with built in battery changing circuit.
- C. All security hardware to be the products of one manufacturer.

## PART 3 - EXECUTION

### 1. INSPECTION

- A. Require installer to inspect doors and areas where equipment is to be applied and notify contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 2. INSTALLATION

- A. General:
  - i. Comply with manufacturer's written instructions and recommendations for installation of system components.
  - ii. Install electronic lock units as directed:
  - iii. Check and adjust operation of hardware in place to ensure proper latching and locking. Replace units if any are not fully functional as received.

### HEADING #ES-1

DOORS #: FOYER ENTRY

EACH SLIDING PAIR TO HAVE:

1 GUEST ENTRY READER TESA

NOTES: 1) BALANCE OF HARDWARE BY SLIDING DOOR MANUFACTURER.

**HEADING #ES-2**

DOORS #: STAIR TO EXTERIOR & CORRIDOR TO POOL

EACH DOOR TO HAVE:

1 GUESTROOM ENTRY READER TESA

NOTES: 1) COORDINATE SECURITY HARDWARE WITH ELECTRICAL SYSTEM AND  
HARDWARE PROVIDED BY SECTION 08710.

**HEADING #ES-3**

DOORS #: FITNESS CENTER & MEETING ROOMS

EACH TO HAVE:

1 LOCKSET HT24

NOTES: 1) BALANCE OF HARDWARE BY SECTION 08710.

**SECTION 08800 GLAZING**

**PART 1 - GENERAL**

**1.01 SYSTEM DESCRIPTION**

**A. Design requirements:**

1. Comply with wind load criteria required by local code.
2. Maximum allowable deflection: Not exceed  $L/175$  or  $\frac{3}{4}$ ", whichever is less at rated loads.
3. Base glass thickness on design factor of 2.5 which gives statistical probability of failure of eight lites per 1000 at rated load.
4. Other characteristics for particular glasses: Indicated in PART 2.

**1.02 WARRANTY**

**A. Special warranty:**

1. Thermal insulating units: Warrant from failure due to loss of edge seal for ten-year period.
2. Unframed mirrors: Warrant against silver spoilage for ten-year period.
3. Begin warranty at Date of Substantial Completion.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

**A. General:**

1. Products specified as standard of quality are indicated in ARTICLE 2.02 - MATERIALS and ARTICLE 2.03 - MANUFACTURED UNITS.
2. Products of manufacturers or fabricators listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to following requirements:
  - a. Product list approval.
  - b. Sample approval.

- c. Using specified materials in fabrication, or, in absence of certain minor materials, using industry accepted standards and reference standard accepted materials and procedures.
- 3. Products specified in ARTICLE 2.04 - ACCESSORIES have acceptable manufacturers listed in ARTICLE 2.04.
- B. Clear and tinted glass manufacturers:
  - 1. AFG Industries.
  - 2. Ford Motor Company, Glass Division.
  - 3. Guardian Industries, Corp.
  - 4. Libby-Owens-Ford Company (LOF).
  - 5. PPG Industries, Inc., Glass Group.
- C. Wire glass manufacturers:
  - 1. Ashai Glass Company of Japan.
  - 2. Nippon Electric Glass Company, Ltd.
  - 3. Pilkington Glass of Great Britain.
- D. Glass products fabricators:
  - 1. Tempered glass:
    - a. AFGD, Inc.
    - b. Interpane.
    - c. Guardian Industries, Corp.
    - d. Viracon.
  - 2. Spandrel glass:
    - a. AFGD, Inc.
    - b. Interpane.
    - c. Guardian Industries, Corp.
    - d. Viracon.
- E. Mirror fabricators:
  - 1. ACI Glass, VVP America.
  - 2. AFGD, Inc.
  - 3. Carolina Mirror Company.
  - 4. Consolidated Glass & Mirror Corp.
  - 5. Gardner Mirror Company.
  - 6. Virginia Glass Products Corp.
- F. Insulating glass fabricators:
  - 1. AFGD, Inc.
  - 2. Guardian Industries, Corp.
  - 3. Independent Insulating Glass Company.
  - 4. Spectrum Glass Products, Inc.
  - 5. Viracon.

## 2.02 MATERIALS

- A. General: Glass products specified below are basic glass materials for Project. MANUFACTURED UNITS Article may require materials indicated below as basis to manufacture or fabricate additional final products in MANUFACTURED UNITS Article.
- B. Clear glass:
  - 1. Float: ¼" thickness, minimum; ASTM C1036-91, Type I, Class 1, Quality q3.
  - 2. Tempered:
    - a. Thickness: ¼" thickness, minimum; ASTM C1048-85, Kind HT, Type I, Class 1, Quality q3; Condition A, B, or C for final use. Fully temper in accord with ANSI Z97.1-1984.

- b. Butt joint glass: Units free of tong marks and surface defects on exposed edges.
- c. SGCC certification label or bug.

C. Tinted glass:

1. Float:  $\frac{1}{4}$ " thickness, minimum; ASTM C1036-91, Type I, Class 2, Quality q3.
2. Tempered:
  - a. Thickness:  $\frac{1}{4}$ " thickness, minimum; ASTM C1036-92, Kind HT, Type I, Class 3, Quality q3; Condition A, B, or C for final use. Fully temper in accord with ANSI Z97.1-1984.
  - b. SGCC certification label or bug.
3. Single lite performance values:
  - a. Daylight transmittance: 76%.
  - b. U value:
    - 1) Winter, night: 1.09.
    - 2) Summer, day: 1.09.
  - c. Shading coefficient: 0.73.
4. Color: Blue-Green.

D. Wire glass:

1. Thickness:  $\frac{1}{4}$ " thickness.
2. Type and mesh: Diamond or misco mesh, ASTM C1036-91, Type II, Class 1, Form 1, Quality q8, Mesh m1; ANSI Z97.1-1984.
3. UL listed as fire-retardant.
4. Fire resistant glazing sealant, acceptable product: Rectorseal, Inc.; Metalcaulk Series for installation of wire glass in openings.

## 2.03 MANUFACTURED UNITS

A. Spandrel glass:

1. Type: ASTM C1036-92, Kind HS, Condition B, Type II, (tinted) Class 3, Quality q3, heat-strengthened glass.
2. Base glass color: Blue-Green. Indicated above with indicated performance values.
3. Thickness:  $\frac{1}{4}$ " thickness.
4. Final color: Selected by Architect from manufacturer's standard colors.
5. Factory applied opacifier coating.
6. Spandrel insulation specified in Building Insulation Section.

B. Unframed mirrors:

1. Glass:  $\frac{1}{4}$ " thickness, ASTM C1036-91, Type I, Class 1, Quality q1; 83% minimum reflectivity; plate or float glass.
2. Coatings:
  - a. Base coats: Silver coating and electrolytically copper plated back.
  - b. Top coats: Coating similar to Carolina Mirror, Polyglaze or PPG Industries, Diamond Back two coat system.
3. Grind and polish exposed edges to pencil edge; coat edges with sealer similar to Carolina Mirror, Loyal Sealer.
4. Provide State of Florida required safety backing.

C. Thermal insulating units:

1. Normal strength units:
  - a. Inboard lite:  $\frac{1}{4}$ " thickness, clear, float glass.
  - b. Outboard lite:  $\frac{1}{4}$ " thickness, tinted, float glass.
  - c. Total unit thickness: 1".
2. Tempered units:
  - a. Inboard lite:  $\frac{1}{4}$ " thickness, clear, tempered glass.
  - b. Outboard lite:  $\frac{1}{4}$ " thickness, tinted, tempered glass.
  - c. Total unit thickness: 1".

3. Spacer: Metal complete with desiccant; size to produce indicated air space.
4. Primary seal: Polyisobutylene; continuously applied each side of spacer to bond spacer to each lite.
5. Secondary seal:
  - a. Acceptable products:
    - 1) Dow Corning Corp.; Dow Corning #982 Insulating Glass Sealant.
    - 2) General Electric Company Silicone Products Division; IGS 3211 Silicone Construction Sealant.
  - b. Type: Silicone sealant; bonds to metal spacer and glass lite face adjacent spacer; applied as three side bond.
6. Comply with ASTM E774-84a, Class A.

## 2.04 ACCESSORIES

- A. Setting blocks and edge cushions:
  1. Setting blocks:
    - a. Neoprene, EPDM, or silicone; ASTM D1056-78, 85  $\pm$ 5 Shore A durometer hardness.
    - b. Width: 1/16" less than full channel width.
    - c. Height: Sufficient height to provide recommended nominal bite and minimum edge clearance.
    - d. Length: 0.1" length per SF glass, but not less than 4" long.
  2. Edge cushions: Neoprene; ASTM D1056-78, 65  $\pm$ 5 Shore A durometer hardness, 3" long minimum.
- B. Spacer shims: Neoprene; ASTM D1056-78, 40-50 durometer hardness.
- C. Glazing gaskets for entrance doors, aluminum framing systems, and manufactured systems: Specified in respective section.
- D. Mirrors:
  1. Adhesive:
    - a. Acceptable products:
      - 1) Miracle Adhesives Company; Type M, Black Magic.
      - 2) Palmer Products Corp.; Mirro-Mastic.
      - 3) Pecora Corp.; THR4, Mirror-Tac.
    - b. Characteristics: Asbestos free specially formulated synthetic rubber mastic for use in attaching mirrors to substrate.
  2. Supports:
    - a. Acceptable product: Stylemark, Inc.; #110090.
    - b. Characteristics: 3/8" by 7/8" angle support, full mirror length; #110 buffed bright natural finish.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verification of conditions:
  1. Verify compliance with following requirements prior to beginning glazing work.
  2. Framing is anchored in position, plumb and square within 1/8" of nominal dimensions indicated.
  3. Fastener heads and projections are removed from glazing rabbets.
  4. Corners and fabrication intersections are sealed; framing is weathertight.
  5. Rabbets at sills weep to outside; rabbets are sufficient depth and width to receive glazing material and provide overlap of glazing material.
  6. Wood frames have received prime paint coat in accord with Paints Section.



### 3.02 APPLICATION

- A. Preliminary work:
  - 1. Clean glazing channel of debris and protective coating immediately prior to glazing. Use material acceptable to framing, glazing material, and glazing sealant manufacturers.
  - 2. Inspect glazing material prior to installation. Eliminate lites having face or edge damage.
- B. Cutting or altering lites of tempered, spandrel, or insulating glass in field is prohibited.
- C. Performance requirements:
  - 1. Install glazing in accord with GANA, Glazing Manual, requirements, storefront or window manufacturer requirements, glass manufacturer's or fabricators requirements, and coordinated specified requirements.
  - 2. Install glazing materials to obtain airtight and watertight installation and withstand temperature changes and windloads without failure.
  - 3. Protect glazing material faces and edges during handling and installation.
  - 4. Size glazing materials for each opening to ensure bite on glazing material, without imposing strain, in accord with manufacturer's product data.
  - 5. Maintain minimum bed clearance between glazing material and sash of 1/8", both sides, except where greater clearance is required by either glazing material or framing manufacturer.
  - 6. Exposed tong marks on in-place tempered glass are prohibited.
- D. Glazing procedures:
  - 1. Install glazing materials in accord with manufacturer's product data and applicable standards, except where more stringent requirements are specified.
  - 2. Install setting blocks for glazing materials over six SF area. Install at sill rabbet at quarter points. Size setting blocks in proportion to glass weight; minimum 4" length.
  - 3. Shim lites over 100 united inches, inboard and outboard, on all sides using continuous shims.
  - 4. Storefront glazing: Install glazing in accord with entrances and storefronts manufacturer's approved installation instructions.
  - 5. Tempered glass: Position bug or hallmark on unit so final position in framed opening occurs consistently in lower right hand corner of unit, parallel to floor in inconspicuous location.
  - 6. Wire glass: Install in openings in accord with manufacturer's installation instructions to conform to labeling requirements; use special supplied caulking material.
  - 7. Mirrors:
    - a. Prepare walls with primer; install with adhesive in accord with manufacturer's product data; allow for vertical air movement behind unit.
    - b. Install plumb and level.

### 3.03 CLEANING AND PROTECTION

- A. Protect glazing materials subject to damage during construction from breakage by attachment of crossed streamers to framing. Do not mark on surfaces.
- B. Remove and replace broken, cracked, chipped, or damaged glazing materials not more than 48 hours prior to Date of Substantial Completion.

## **DIVISION 9 FINISHES**

### **SECTION 09010. WORK INCLUDED**

- A. Furnish labor and materials to complete work of finishes as indicated on the Drawings and as specified.

### **SECTION 09240. GYPSUM WALLBOARD, CORNER GUARDS & MISC. ACCESS PANELS**

- B. Gypsum board installation: Install gypsum board as shown on the drawings. Install Acrovyn Corner Guard #SFS-20 with 1/4" corner radius, 2" face, per manufacturer's recommendations from floor to ceilings in the corridors as specified on the drawings. (Verify guard with Owner).
- C. Installations of drywall on wood framing shall comply with the following minimum requirements.
  - 1. Thickness of the board shall be as designated on the drawings. Install radius corner beads at all outside corners in guestrooms, public areas, poolroom, stairs, offices, and conference rooms. Radius corners need not be utilized in mechanical rooms, attic, and storage rooms.
  - 2. Spacing of nailing members shall not exceed 16" o.c. for walls and ceilings; 24" o.c. at roof trusses.
- C. Provide "B" label clothes chute doors as shown on the plans.
- D. Provide access panels as required for plumbing valve access or H & V work.

### **SECTION 09255. SOUND BOARD**

- A. Sound Board Installation: Install sound deadening board wall types indicated on the plans. Sound board to be as manufactured by USG, Gold Bond or GAF or equal and to be 1/2" x 4'-0" x 8'-0" sheets (gypsum product - noncombustible.)
- B. Spacing of fastening devices not to exceed that specified for gypsum wallboards. Seams in soundboard shall not align with seams in gypsum board cover layer(s).

### **SECTION 09280. TYPE "X" GYPSUM BOARD**

- A. "Type X" Gypsum Board Installation: Install Type "X" Gypsum Board as shown on the Drawings and as herein specified.
- B. Furnish and install 5/8" thick, Type "X" Gypsum Board as shown on the drawings and as herein specified.
  - 1. Furnish and install 5/8" thick, Type "X" Gypsum Board in all areas noted as follows in order to achieve a (1 hour) fire rating.
  - 2. Furnish and install 5/8" thick, Type "X" gypsum board on both sides of all bearing walls full height. The bearing walls are as noted on the Plans.
  - 3. Furnish and install 5/8" thick, Type "X" gypsum board on all first, second, and third floor level ceilings, on both sides of all party walls, and in all Laundry and Storage rooms.

4. In all bathrooms, toilets, and laundry room, Type "X" material will be water resistant.
- C. Installation of all 5/8" thick exterior type "X" gypsum board shall be in strict accordance to 1-hour wall construction (designation WP3510 or WP3520) as indicated in the "Fire Resistance Design Manual", published by the Gypsum Association, 1603 Orrington Avenue, Evanston, Illinois 60201.
- D. Furnish and install 5/8" thick, Type "X" gypsum board on each side of studded truss separation walls, extended to parapets as noted on the Plans.
- E. Installation of all Type "X" gypsum board and Firecode "C" gypsum board shall comply with the following minimum requirements.
  1. Spacing of nailing members shall not exceed 16" o.c. for ceiling and walls; 24" o.c. at roof trusses.
- F. Installation: The following must be observed during installation of wallboards:
  1. Ceiling panels are to be attached with 5d cement coated nails 6" o.c. where attached to wood joists and type "S" Bugle Head screws to ceiling RC-1 channels and wood trusses.
  2. Wall panels to be attached with 1 7/8" cement coated nails 7" o.c. Perimeter at bottom is to be caulked.
  3. U.S. Gypsum RC-1 resilient channels to be attached to studs with U.S.G. Co. 1 1/4" type "S" Bugle Head Screws.
  4. Attach gypsum board to RC-1 channel with 1" type "S" Bugle Head Screws.
  5. Provide U.S.G. Dur-A-Bead No. 103 at all external corners.
  6. Joint treatment to be Perfatape reinforcing tape with Dur-A-Bond Joint Compounds and U.S.G. finish coat in accordance with manufacturer's specifications (3 coats). Use Dur-A-Bond 90 Compound at all exterior walls. All piping penetrations must be mudded in tight.
  7. Use W/R sealant for W/R gypsum panels.
  8. Cut wallboard for all electrical outlets, grilles, A/C sleeves, plumbing pipes, etc. in a neat, tight fitting manner. All penetrations of Gyp Board must be mudded in.
  9. Apply gypsum board first to ceilings and then to walls.
  10. Provide and install water resistant "greenboard" on all exterior wall surfaces including window returns.
  11. SPECIAL NOTE: Contractor and Owner's representative are to inspect and verify that all gypsum board delivered to the jobsite for use on this project is to be free from dirt, mold or mildew contamination. Certification from the Supplier or Contractor that the drywall has been properly stored and is thoroughly clean will be required.

#### **SECTION 09290. PRE-ROCK GYPSUM**

- A. Provide 5/8" DensGuard for all stair, shaft or corridor pre-rock conditions necessary prior to installation of roof shingles or membrane. Contractor to utilize either DensGlass Ultra or DensArmor in all shaft interiors.

**SECTION 09300 TILE****PART 1 - GENERAL****1.01 MAINTENANCE****A. Extra materials**

1. Furnish two full unbroken cartons of each type and color tile specified for Owner's maintenance.
2. Store on Project site where directed by Owner.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS****A. Acceptable manufacturers**

1. Products specified as standard of quality are indicated in MANUFACTURED UNITS Article.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to approval of product list and samples.

**B. Tile**

1. American Olean Tile Company.
2. Dal-Tile Corp.
3. Florida Tile Division, Sikes Corp.
4. Mannington Tile Company.
5. Summitville Tiles, Inc.
6. United States Ceramic Tile Company.

**C. Mortars, grouts, and latex admixtures**

1. American Olean Tile Company.
2. Bostik Construction Products.
3. Custom Building Products.
4. Laticrete International, Inc.
5. Mapei Corp.

**2.02 MANUFACTURED UNITS****A. Unglazed ceramic mosaic tile**

1. ANSI 137.1-1988, Section 5.1, Standard Grade, Porcelain type, impervious, maximum absorption 0.5%.
2. Edges: Cushion.
3. Colors: As indicated on Owner's Finish Schedule.
4. Nominal face size: 2" by 2".
5. Thickness: 1/4".
6. Mounting: Factory mounted, permanent mesh, dot, or net mounting with 1/16" wide joints. Tile back shall achieve minimum 70% bond with setting material.
7. Static co-efficient of friction; ASTM D2047-82 (1988): Meets ADA requirements.
8. Trim shapes: Match unglazed mosaic tile color and size for thin-set application.
9. Base: 5" high, composed of coved and flat tile and bullnose cap; same size as floor tile.

**B. Glazed wall tile base**

1. ANSI 137.1-1988, Section 6.1, Standard Grade, non-vitreous; bright glazed.
2. Edges: Cushion.
3. Colors: As indicated on Owner's Finish Schedule.
4. Nominal face size: 6" by 6".
5. Thickness: 5/16".
6. Furnish tile with edge spacer lugs.
7. Trim shapes: Match tile color and size for thin-set application. Include 6" high coved bullnose base and corner units.

**2.03 COMPONENTS**

**A. Setting materials**

1. Setting materials and admixtures from same manufacturer or compatible with grouting materials.
2. Special note: Using water in mix of any materials below in this Paragraph is prohibited unless specifically indicated in manufacturer's reviewed product data for system used.
3. Latex-Portland cement flexible polymer modified mortar for tile, glass tile, large glass bodied porcelains, granite, stone
  - a. System quality standard: Mapei Corp.; Keralastic® System.
  - b. Dry bagged material:
    - 1) Acceptable product: Mapei Corp.; Kerabond®.
    - 2) Characteristics: ANSI A118.4-1992, factory blended mixture of pre-sanded Portland cement and thin-set additives.
  - c. Latex additive, acceptable product: Mapei Corp.; Keralastic®.
  - d. System performance criteria
    - 1) Polymer category: Acrylic copolymer.
    - 2) Solids content: 28%-32%.
    - 3) Specific gravity: 1.026
    - 4) Glass transition temp (°F): -4°F.
    - 5) Particle size (um): 0.25-0.35.
4. Epoxy mortar for tile in kitchens, bars, toilet rooms, showers, and TCA defined wet areas, product quality standard: Mapei Corp.; Kerapoxy®, ANSI A118.3-1992 and TCA Formula AAR-II to 212°F water-cleanable, two component, chemical resistant 100% solids epoxy mortar.

**B. Setting accessories**

1. Shower pans
  - a. Acceptable products
    - 1) B. F. Goodrich Company: BFG Vinyl Water Barrier 30 mil thickness.
    - 2) The Noble Company; Chloroloy 240, 40-mil thickness.
    - 3) York Manufacturing Inc.; York Copper Fabric Shower Pan, five oz. copper core.
  - b. Manufacturer's standard adhesive.
2. Control joint isolation membrane strips:
  - a. Acceptable products:
    - 1) Dal-Tile Corp.; Dal-Seal TS.
    - 2) The Noble Company; Nobleseal TS.
  - b. Manufacturer's standard solvent fused seam sealer.
3. Waterproof/isolation membrane at horizontal surfaces receiving tile materials as final surface on 2<sup>nd</sup> 3<sup>rd</sup> and 4<sup>th</sup> floors complete and under tubs turned up wall as water dam.
  - a. Acceptable products
    - 1) Dal-Tile Corp.; Dal-Seal TS.
    - 2) The Noble Company; Nobleseal TS.
  - b. Accessories: Manufacturer's standard solvent fused seam sealer.

4. Primer for tile on gypsum underlayment: Specified in Gypsum Section.

**C. Grouting materials**

1. Grouting materials and admixtures from same manufacturer and compatible with setting materials.
2. Special note: Using water in mix of any materials below in this Paragraph is prohibited, unless specifically indicated.
3. Dry-set grout for tile joints 1/8" or less, porous body tile or glazed tile in areas not defined as TCA wet areas
  - a. Product quality standard: Mapei Corp.; KER 800 Series Grout.
  - b. Characteristics: ANSI A118.6-1992, factory blended mixture of Portland cement and dry polymer additives.
  - c. Grout colors: As selected on Owner's Finish Schedule from acceptable product manufacturer's standard colors.
4. Grout for tile joints 1/8" or less, porous body tile or glazed tile with mildew and fungus resistant additives in TCA defined wet areas
  - a. Product quality standard: Mapei Corp.; Kerapoxy®.
  - b. Characteristics: ANSI A118.3-1992 multi-component.
  - c. Colors: As selected on Owner's Finish Schedule from acceptable product manufacturer's standard colors.

- D. Marble thresholds: Marble Institute of America (MIA) Group A, honed finish; sizes and shapes indicated; color selected by Architect.**

**E. Miscellaneous accessories**

1. Manufacturer standard of quality: Schlüter® Systems, L.P.
2. Accessories: Based on manufacturer standard of quality product.
  - a. Support profile for base tile: Schlüter®-BARA-SOT 110; right angle support with foam insulation strip; 4-3/8" high.

## 2.04 ACCESSORIES

- A. Sealant at tile/plumbing fixtures: Silicone bath sealant, specified in Joint Sealants Section.**

**B. Grout release agents:**

1. Acceptable manufacturers
  - a. American Olean Tile Company.
  - b. Klein Company, Inc.
2. Type, based on Klein Company, Inc. products; use for protecting following tile
  - a. Ceramic tile: Grout Guard2.

**C. Cleaners**

1. Acceptable manufacturers
  - a. American Olean Tile Company.
  - b. Klein Company, Inc.
  - c. Mapei Corp.
  - d. Summitville Tiles, Inc.
2. Type, based on Klein Company, Inc. products; use for cleaning following conditions
  - a. Ceramic tile (acidic cleaner): Easy Etch.
  - b. Grout release neutralizer: MK Powder.
  - c. Non-acid grout cleaner: All-Off.
  - d. Latex grout film remover: Film Strip or Floor Stripper.
  - e. Epoxy residue remover: Mapei Corp.; Epoxy Residue Remover.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

#### **A. Verification of conditions**

1. Verify grounds, anchors, plugs, hangers, bucks, electrical, and mechanical work in or behind tile are in position.
2. Verify gypsum underlayment primed in accord with gypsum manufacturer's recommendations by floor underlayment installer.

### **3.02 INSTALLATION**

#### **A. General; use following as basis for tile installation along with other specified requirements**

1. ANSI standards
  - a. A108.5-1992: Dry-set Portland cement mortar or latex modified Portland cement mortar.
  - b. A108.6-1992: Chemical resistant water cleanable tile setting and grouting epoxy.
  - c. A108.10-1992: Installation of grout in tile work.
  - d. A108.11-1992: Interior Installation of CBU.
2. TCA Handbook standards
  - a. Floors, interior, concrete: F115-98; Dry-set Mortar, Epoxy or Furan Grout.
  - b. Floors, waterproof membrane: F122-98; Thin-set.
  - c. Walls, cementitious backer units: W244-98; Dry-set Mortar or Latex-Portland Cement Mortar.
  - d. Expansion joints, vertical and horizontal: EJ171-98; Joint Design Essentials.
  - e. Thresholds, saddles: TH611-98.
  - f. Ceilings, interior: C311-98.

#### **B. Setting accessories**

1. Shower pans: Install in accord with manufacturer's installation instructions where indicated; leave ready for installation of tile materials.
2. Control joint isolation membrane strips:
  - a. Install 3" wide strip, minimum, continuous over stress cracks and control joints in concrete slabs where tile expansion joint is not located directly above control joint. Embed in latex modified thin set mortar.
  - b. Tile expansion joint locations: Within 1'-0" of control joint and at other TCA Standards locations specified below.
3. Waterproof/isolation membrane
  - a. Prepare surfaces to receive waterproof/isolation membrane in accord with waterproof manufacturer's product data. Fill voids and cracks in substrate in accord with manufacturer's product data.
  - b. Flash areas up vertical surfaces and penetrations as recommended by manufacturer's product data and detailed on reviewed shop drawings.
  - c. Install membrane in longest pieces practical to minimize joints in accord with membrane manufacturer's installation instructions; fuse joints using manufacturer's required seam sealer.
  - d. Leave surface ready to receive setting bed or tile as indicated on Drawings. Protect membrane surface if remainder of tile installation procedures are delayed.

#### **C. Tile**

1. Center tile in spaces with equal width tiles at opposite walls, with no tiles less than ¼ tile wide.
2. Cut and drill tile and trim shapes without damage to exposed faces. Rub cut edges smooth with Carborundum stone.

3. Joints
    - a. Floor tile: Perpendicular and parallel to walls, unless skewed walls are indicated.
    - b. Wall tile: Vertical and horizontal, unless otherwise indicated.
    - c. Width
      - 1) Ceramic mosaic tile: Width set on matrix backer.
      - 2) Glazed wall tile: Width determined by spacer lugs.
    - d. Joints flush with tile face.
    - e. Align vertical base joints with floor tile joints.
  4. Expansion joints
    - a. Locate expansion joints before tile is installed.
    - b. Joints at control joints in concrete slab.
    - c. Spacing: Space joints through tile at spacings indicated, not more than 16'-0" O.C. each direction.
    - d. Form joints at internal vertical corners of wall tile and at joints between tile and dissimilar materials.
    - e. Joint width: Same width as adjacent tile joints except at building expansion joints, joint width same width as building expansion joint.
    - f. Caulk using sealant specified above; omit grout. Perform caulking after completed tile installation and proper curing time, prior to cleaning tile.
  5. Thresholds: Install using same method specified for adjacent floor tile.
  6. Miscellaneous accessories: Install where indicated on Drawings in accord with accessory manufacturer's installation instructions.
  7. Grind and fit tiles at intersections, against trim, and at built-in fixtures and accessories. Fit around outlets, pipes, fixtures, and fittings so plates, escutcheons, and collars overlap work.
  8. Back butter impervious tile with mortar completely just prior to placing on substrate.
- D. Caulk perimeter of plumbing fixtures at tile with silicone bath sealant in accord with requirements of Joint Sealants Section.
- E. Tolerances: Plumb, level, and true to line within  $\pm\frac{1}{2}$ " in an undivided space and  $\pm\frac{1}{16}$ " maximum in a running foot.

### 3.03 CLEANING AND PROTECTION

#### A. Cleaning

1. Clean tile as work progresses, preventing accumulation of setting and grouting materials or debris on tile faces.
2. Clean glazed tile and thresholds using solution of detergent and water only. Cleaning glazed tile and thresholds with acids is prohibited.
3. Utilize specified cleaning solution and clean water for cleaning. Work in areas not exceeding 20 SF., scrubbing tile surfaces to remove residue. Do not scrub grout joints.
4. Flush cleaned areas with water immediately after cleaning. Scrub surfaces with clean water to remove remaining film.
5. Do not reuse cleaning solutions. Discard solutions containing residue and debris from cleaning operations in manner to prevent contamination or staining of adjacent work.

#### B. Protection

1. Protect installed tile work until Date of Substantial Completion by covering with kraft paper; tape joints and edges.
2. Remove not more than 48 hours prior to Date of Substantial Completion; final clean tile.



## **SECTION 09500. ACOUSTICAL TREATMENT**

- A. This section encompasses acoustical tile ceilings in areas as indicated on the Drawings and in the Room Finish Schedule on the Drawings.
- B. Materials (Provided by Contractor):
1. Corridor suspended acoustical tile shall be 24" x 24" x 5/8" nominal Armstrong Cortega Minaboard #770 Class A flame spread (0-25). Do not store where relative humidity exceeds 70%. Install after building is closed in as directed by job superintendent. Exposed grid system to be factory finished white. **Note:** Locations of corridor, stairwell, entry and exit lighting fixtures will have priority over sprinkler heads, grilles and smoke detector locations.
  2. Meeting Room acoustical tile shall be U.S.G. #707 24" x 24" x 3/4" thick regular "Shadowline" white. Exposed grid system to be factory finished white. This same tile and grid shall be installed in Work Center and Interview Area (if these rooms are included on this project.) (See electrical fixture layout.)
  3. All suspended acoustical ceilings shall be Class A or Fire Guard rated.
  4. Canopy Ceiling: USG Interiors, Inc. Auratone metal face, non-perforated, No. 56-094, 24" x 48" x 5/8" lay-in ceiling tiles in an exposed suspended aluminum grid system. The exposed grid system is to be factory finished white.
- C. Metal Suspension System:
5. The metal suspension system shall be a commercial exposed grid consisting of 1 1/2" high T-bar with square bulb section.
  6. Framing shall comply with ASTM C635 metal suspension systems for Acoustical tile and lay-in panel ceilings.
  7. A metal suspension system shall have a white baked-on enamel finish. Mfg: Donn or Chicago Metallic.
  8. The lay-in metal suspension shall be supported by No. 9 annealed hanger wire. Attach hanger to underside of wood or steel joists.

## **SECTION 09650 RESILIENT FLOORING**

### **PART 1 - GENERAL**

#### **1.01 DEFINITIONS**

- A. Terms:
1. ADA: *Americans with Disabilities Act*, 1991; in particular dealing with slip resistance and static coefficient of friction under requirements of ASTM D2047-82 (1988); 0.5, minimum for accessible areas, 0.8 for ramps. Generally deals with ramps and stairs.
  2. Excess moisture content test: Industry standard hydrostatic pressure test for excess moisture content in slab, on grade or elevated using anhydrous calcium chloride. Moisture content for specified products are defined in adhesive manufacturer's product literature as pounds water per 1000 SF per 24 hours (indicated below as #/KSF).

## 1.02 MAINTENANCE

### A. Extra materials:

1. Furnish additional materials as follows:
  - a. Floor tile: One unopened carton from same run for each 1000 SF floor surface for each color or pattern to a maximum of ten boxes.
  - b. Base: 20 LF from same run for each 1000 LF or portion thereof for each color to a maximum of 100LF.
2. Store on Project site where directed by Owner.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

#### A. Acceptable manufacturers:

1. Products specified as standard of quality are indicated in MANUFACTURED UNITS Article.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to approval of product list and samples.

#### B. Vinyl composition tile:

1. Armstrong World Industries, Inc.
2. American Biltrite, Inc.
3. Azrock Floor Products Div., Azrock Industries Inc.
4. Mannington Mills, Inc.
5. Tarkett.
6. Vinyl Plastics, Inc.

#### C. Rubber base; thermoplastic:

1. Armstrong World Industries, Inc.
2. Burke Flooring Products Div. Burke Industries.
3. Endura.
4. Flexco Company.
5. Mercer Products Company, Inc.
6. R. C. Musson Rubber Company.
7. Nora Rubber Flooring, Freudenberg Building Systems, Inc. (referred to as Nora)
8. Pirelli Rubber Flooring.
9. Roppe Rubber Corp.

#### D. Accessories:

1. Flexco Company.
2. Johnsonite Div. of Duramax, Inc.
3. Mercer Products Company, Inc.
4. R. C. Musson Rubber Company.
5. Roppe Rubber Corp.
6. Tarkett.

#### E. Application materials:

1. Mapei Corp.
2. Minwax Construction Products Division.
3. U. S. Grout Corp.
4. W.R. Bonsal Company.
5. H. B. Fuller Company.
6. Floor covering manufacturers indicated above.

## 2.02 MANUFACTURED UNITS

### A. Vinyl composition tile:

1. Product quality standard: Mannington Mills, Inc.; Essentials.
2. Size: 12" by 12" face size by 1/8" thickness.
3. ASTM F1066-87, Class 2.
4. FS SS-T-312B, Type IV, Composition 1, Asbestos Free.
5. Critical radiant flux; ASTM E648-93a and NFPA 253-1990: Class 1.
6. Smoke density; ASTM E662-93 and NFPA 258-89: Less than 450.
7. Through-chip material; laminated product not permitted.
8. Colors: Indicated in Owner's Interior Finish Schedule.

### B. Base:

1. Material: TPR; thermoplastic rubber; 2-8% rubber content.
2. Height: 4".
3. Style: Standard toe.
4. Thickness: 1/8".
5. Lengths: Manufacturer's standard coils; not less than 50 foot long; four foot long pieces are prohibited.
6. Manufacturer's standard outside preformed corners; same gauge, color, height, and style as adjacent base.
7. Colors: Indicated in Owner's Interior Finish Schedule.

### C. Accessories:

1. Thresholds:
  - a. Molded or extruded vinyl, half saddle.
  - b. Lengths for opening dimensions without joints.
2. Reducers:
  - a. Product quality standard: Mercer Products Company, Inc.; Tile Reducer, #600 Series, actual series determined by tile thickness.
  - b. Material: Vinyl.
3. Edge trim:
  - a. Product quality standard:
    - 1) Carpet, glue down: Mercer Products Company, Inc.; Imperial Reducer #700.
    - 2) Mercer Products Company, Inc.; Vinyl reducer #735.
  - b. Material: Vinyl.
4. Colors: #121 Brown Black.

### D. Application materials:

1. Crack filler; product standard of quality: Mapei Corp.; PLANI/PATCH with PLANI/PATCH PLUS.
2. Adhesives; select for finish floor materials indicated above. Floor covering manufacturer may require use of flooring covering manufacturer specific approved adhesive in lieu of below specified products; meet characteristics specified.
  - a. Product standard of quality:
    - 1) VCT to 2.5#/KSF moisture tolerance: Mapei Corp.; ULTRA/BOND ECO 300.
    - 2) VCT over well cured concrete to 3.0#/KSF moisture tolerance: Mapei Corp.; ULTRA/BOND ECO 710.
    - 3) Vinyl base: Mapei Corp.; ULTRA/BOND ECO 575.
  - b. Characteristics: Solvent-free, low odor, low TVOC content, non-flammable, asbestos free adhesives.
3. Primer: Types and brands recommended by floor covering manufacturer; asbestos free.
4. Wax and cleaner: Types recommended by floor covering manufacturer for particular flooring material type.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

#### **A. Verification of conditions:**

1. Verify concrete slabs are well cured, at least 45 days old, have no residual curing compound to inhibit adhesive bonding to concrete surface, and ready to receive floor covering materials.
2. Conduct hydrostatic pressure test for excess moisture content using standard calcium chloride moisture test. Excess moisture content for specified products are defined in adhesive manufacturer's product literature.
3. Notify Architect, in writing, of surfaces not passing calcium chloride test for adhesive manufacturer's allowable moisture content.

### **3.02 INSTALLATION**

#### **A. Preparation:**

1. Remove dirt, oil, grease, or other foreign matter from surfaces to receive floor covering or accessories.
2. Neutralize traces of strong acids or alkalis prior to adhesive application.
3. Fill cracks 1/16" wide and wider and depressions 1/8" deep and deeper with crack filler; rout out cracks and remove loose material prior to filling cracks.

#### **B. Adhesive application, general:**

1. Mix and apply adhesives in accord with manufacturer's product data. Apply with notched trowel or other tools recommended by adhesive manufacturer.
2. Observe adhesive manufacturer's recommended safety precautions during adhesive mixing and application.
3. Apply adhesive to area covered by resilient material within recommended working time of adhesive.
  - a. Remove dried or filmed over adhesive.
  - b. Do not soil walls, bases, or adjacent areas with adhesives.
  - c. Remove spilled or misplaced materials.

#### **C. Resilient tile:**

1. Lay tile beginning at center of room or space, working toward perimeter. Cut border tile to fit within 1/32" of abutting surface.
2. Fit flooring material into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.
3. Lay tile with grain or pattern running in same direction between adjacent tile.
4. Roll flooring with 150 lb. sectional roller, if required by tile manufacturer's printed installation instructions.

#### **D. Base:**

1. Unroll base material and cut into lengths for minimum number of joints. Double cut adjoining lengths.
2. Install with tight butt joints with no joint widths greater than 1/64".
3. Apply adhesive and adhere to vertical surfaces.
4. Press down and set bottom edge to floor surface profile.
5. Form external corners using premolded corners.
6. Form internal corners by mitering.
7. Scribe base to abutting materials.

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**E. Accessories:**

1. Cut materials to lengths and sizes indicated.
2. Apply adhesives and bond to substrate.
3. Center thresholds and reducers at closed door centerline.
4. Fit edge to door frame jambs without visible gaps or cracks.
5. Fit edges to abutting floor materials for flush fit.

**3.03 CLEANING**

- A. Clean surfaces using neutral cleaner acceptable to material manufacturer upon installation completion.
- B. Not more than 48 hours prior to Date of Substantial Completion, apply two coats of flooring manufacturer's approved non-slip wax to clean floor surfaces and buff.

**3.04 PROTECTION**

- A. Surface protection: Protect finished flooring, base, and accessories from staining, marring, or other physical damage by construction activities in other sections. Cover or mask surfaces in accord with specific manufacturer's protection requirements.

**SECTION 09680 CARPET**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes carpet, pad, and carpet edge strips furnished to Project site by others, installed under this Section and Contract.

**1.02 DEFINITIONS**

**A. Terms:**

1. CFI certification: Individual installer certification levels requiring designated minimum time in trade with various carpet types and locations from residential (Basic R1) and R2, Commercial (basic C1) and C2, to Master Installer. Several certification levels may be working on Project depending on carpets and installation methods.
2. Excess moisture content test: Industry standard hydrostatic pressure test for excess moisture content in slab, on grade or elevated using anhydrous calcium chloride. Moisture content for specified products are defined in adhesive manufacturer's product literature as pounds water per 1000 SF per 24 hours (indicated below as #/KSF).
3. Electronic equipment: Any computer, work processor, terminal, or other peripheral component, communications processor, typesetter or broadcast equipment sold by a recognized manufacturer (or its authorized distributor, agent, or representative) and installed and serviced by qualified personnel.
4. Malfunction: Any failure of electronic equipment caused by carpet induced static electricity, provided equipment is operating within specifications in every other respect.
5. Static: Electric charge built up and later discharged from a person, cart or other objects as a result of movement of that person or object upon the floor covering.

**1.03 SUBMITTALS**

**A. Quality control submittals:**

1. Certificates:
  - a. Installer: CFI certificate for carpet types and quantities specified (performance levels R1, R2, C1, C2, and Master).
  - b. Carpet manufacturer's statement of acceptance of compatibility of concrete slab curing/sealing materials with carpet adhesive.

**1.04 QUALITY ASSURANCE**

**A. Qualifications:**

1. Manufacturer: Firm regularly engaged in manufacture of products specified in this Section, whose products have been in satisfactory use, under similar service conditions, for not less than five years.
2. Installer/dealer:
  - a. Regularly engaged in procurement and installation of products specified in this Section for a minimum period of time of five years prior to start of this work.
  - b. Certified Floor covering Installer certification for carpet types specified (performance levels R1, R2, C1, C2, and Master); identification badge required on Project site for each crew indicating performance level.

**1.05 MAINTENANCE**

**A. Extra materials:**

1. Salvage scraps from installation over three SF area and over 1'-0" in width for Owner's "Attic Stock".
2. Store on Project site where directed by Owner.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

**A. Carpet, carpet pad, and carpet edge strip: Furnished to Project site by Owner (GC to coordinate installation).**

**B. Tackless carpet stripping:**

1. Water resistant wood stripping with angular pins for gripping and holding stretched carpet.
2. Stripping with two rows of pins for carpet installations less than 20'-0" in width; three rows for carpet over 20'-0" in width.

**C. Adhesives:**

1. Carpet cut pile edges seam sealer: Natural latex type recommended by carpet manufacturer.
2. Direct glue down installation: Floor covering manufacturer may require use of flooring covering manufacturer specific approved adhesive in lieu of below specified products; meet characteristics specified.
  - a. Product standard of quality to 2.5#/KSF maximum moisture tolerance: Mapei Corp.; ULTRA/BOND ECO 300.
  - b. Characteristics:
    - 1) Anti-microbial protection in both wet and dry film; ASTM G21-70 (1985).
    - 2) Furnish VOC compliant and TVOC emissions compliant adhesives required by code.

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**D. Miscellaneous materials:**

1. Crack filler:
  - a. Acceptable manufacturers:
    - 1) Mapei Corp.
    - 2) Minwax Construction Products Division.
    - 3) U. S. Grout Corp.
    - 4) W.R. Bonsal Company.
  - b. Characteristics, product standard of quality: Mapei Corp.; PLANI/PATCH with PLANI/PATCH PLUS.
2. Tackless installation: Furnish 2-1/2" wide, minimum, fiberglass seaming tape, thread, and accessories for carpet installation.
3. Direct glue-down installation: Furnish seam sealer and accessories for carpet installation.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

**A. Verification of conditions:**

1. Verify concrete slabs are well cured, at least 45 days old, have no residual curing compound to inhibit adhesive bonding to concrete surface, and ready to receive floor covering materials.
2. Conduct hydrostatic pressure test for excess moisture content using standard calcium chloride moisture test. Excess moisture content for specified products are defined in adhesive manufacturer's product literature.
3. Notify Architect, in writing, of surfaces not passing calcium chloride test for adhesive manufacturer's allowable moisture content.

**3.02 INSTALLATION**

**A. General:**

1. Vacuum substrate immediately prior to beginning carpet installation. Remove debris, grease, oil, and foreign materials. Install carpet on dry surfaces.
2. Fill cracks 1/16" wide and wider and depressions 1/8" deep and deeper with crack filler. Remove or level ridges or high spots.
3. Comply with manufacturer's product data except where more stringent requirements are specified.
4. Lay out carpeting materials in accord with reviewed shop drawings.
5. Carpet, general:
  - a. Lay carpet with pattern or texture running in same direction; seaming weft to warp is prohibited; match patterns at seams.
  - b. Lay out for minimum number of seams, unless otherwise indicated on Drawings or reviewed shop drawings.
  - c. Seams running perpendicular to doorways: Locate in manner not to fall in doorway; "T" seams in doorways or openings are prohibited.
  - d. Seams running parallel to doorways at openings: Locate directly under doors in closed position.
  - e. Make cross seams prior to lengthwise seams if cross seams are required.
  - f. Bead cut edges with natural latex adhesive seam sealer.
6. Extend carpet under movable furniture, equipment, and into storage spaces of rooms indicated to receive carpet unless other floor finish is indicated.
7. Install carpet edge strip at locations where edge of carpet is exposed to traffic, except where another device such as threshold is indicated.

8. Maintain edges and seams straight and square with adjacent surfaces.

**B. Tackless installation:**

1. Stripping: Nail stripping to substrate at room perimeter and fixed equipment. Allow for turning down of carpet between base and stripping. Install stripping and pad to placing equipment at built-in counters and equipment having recessed toe space.
2. Pad:
  - a. Install over areas to be carpeted with edges butted against stripping. Install in largest sizes practicable for minimum number of seams. Take care in pad layout not to have pad seam line up with carpet seam indicated in reviewed layouts.
  - b. Ramped areas: Install with adhesive or two-sided tape.
  - c. Tape pad seams with 4" wide carpet tape.
  - d. Apply slight stretch to pad to remove bubbles and wrinkles.
3. Carpet:
  - a. Seam and install carpet in accord with carpet manufacturer's installation instructions for heat bonding method; follow *Commercial Carpet Installation Standard* requirements for heat bonding method if manufacturer does not provide installation instructions.
  - b. Apply seaming cement to cut backing and pile edges without evidence on carpet faces. Allow to dry prior to seaming carpet.
  - c. Re-stretch carpet once, at Owner's request, within one year of installation. Trim and re-secure edges.

**C. Direct glue installation:**

1. General: Seam and install carpet in accord with carpet manufacturer's installation instructions for direct adhesive method; follow *Commercial Carpet Installation Standard* requirements for direct adhesive method if manufacturer does not provide installation instructions.
2. Unroll, cut, and fit carpet lengths for space prior to applying adhesive. Allow 1/2" overlap in adjacent widths in cutting.
3. Apply adhesive in accord with manufacturer's product data. Apply to half of width at one time, beginning at seam with carpet width already laid.
4. Apply seaming cement to cut backing and pile edges without evidence on carpet face. Compress 1/2" overlap at seam by fitting against width already laid; then push looseness away from seam.
5. Roll out air bubbles as installation progresses, using roller weighing approximately 100 lbs.
6. Loosely backsew lengths together where transverse seams are required.
7. Trim carpet at vertical surfaces to straight, true to lines, within 1/32" of abutting surfaces.

### 3.03 CLEANING AND PROTECTION

**A. Cleaning:**

1. Remove debris at completion of installation.
2. Vacuum carpet with commercial type vacuum cleaner having rotating agitator in nozzle. Utilize corner attachment for vacuuming in corners and crevices.
3. Remove stains with spot remover acceptable to carpet manufacturer.

**B. Protection:**

1. Immediately after cleaning, cover carpeted areas with heavy Kraft paper. Maintain in place for remainder of construction period.
2. Not more than 48 hours prior to Date of Substantial Completion, remove protective covering and vacuum carpet. Steam clean areas to remove stains.
3. Replace carpet not cleanable.



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## **SECTION 09720 WALL COVERING**

### **PART 1 - GENERAL**

#### **1.01 PROJECT CONDITIONS**

##### **B. Environmental requirements:**

1. Install materials only when normal temperature and humidity conditions approximate interior conditions that will exist when space is occupied.
2. Remove wall covering materials from packaging and allow to acclimatize to area of installation 24 hours before application.
3. Maintain constant minimum temperature at 65°F. in spaces for at least 48 hours before, during, and 48 hours after application.

#### **1.02 MAINTENANCE**

##### **B. Extra materials:**

1. Furnish 5% material for each color and pattern selected for replacement use of damaged wall covering; furnish in full width by roll or partial roll, as applicable; no single piece less than shortest length installed piece.
2. Store on Project site where directed by Owner.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

##### **A. Wall covering manufacturers, types, styles, and patterns: Indicated on Drawings.**

##### **B. Primer: Type recommended by wall covering manufacturer for substrate encountered.**

##### **C. Adhesives: Strippable, mildew resistant, and non-staining to wearing surface, and type supplied or recommended by wall covering manufacturer for substrate encountered.**

##### **D. Trim shapes:**

###### **1. Plastic:**

###### **a. Acceptable manufacturers:**

- 1) IPC.
- 2) K. J. Miller Corp.
- 3) Koroseal Wall Protection Systems.
- 4) Tri-Guards, Inc.

###### **b. Characteristics:**

- 1) Material: Through colored high impact PVC or Lexan; color selected by Owner's Finish Schedule from manufacturer's standard colors.
- 2) Size: 1-1/8" by 1-1/8" by 8'-0" length.

#### **2.02 FABRICATION**

##### **A. Micro venting or porolator, acceptable porolator: Perforating Industries, Inc., 606 Commerce Road, Linden NJ 07036-2498; Voice (908) 862-0350, Fax: (908) 862-9185.**

##### **B. Shop finishing:**

###### **1. General:**

- a. Remove wall covering from manufacturer's packaging; keep original labeling with each respective material roll.
- b. Porolate or micro vent wall covering using approximately 150 hot tapered needles per square inch in accord with porolator's standard practice.

- c. Reroll, repackage, and ship to Project site with wall covering manufacturer's original labels on each respective roll; attach additional label indicating wall covering has been porolated.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of conditions: Verify gypsum board surfaces have been finished in accord with "Level #" requirements specified in Gypsum Board Assemblies Section for wall covering type specified.

### **3.02 PREPARATION**

- A. Remove dirt, grease, crayon, ink, or other similar markings to prevent color staining or bleeding through vinyl.
- B. Coat markings, which are difficult to remove without damaging substrate surface, with white pigmented oil base primer. Fill cracks, crevices, and holes with compound recommended by wall covering manufacturer.
- C. Sand rough spots smooth and remove residual powder using damp cloth. Surfaces to be covered shall be thoroughly dry.

### **3.03 INSTALLATION**

- A. Remove switchplates, wall plates, surface mounted fixtures, and similar items in contact with surfaces to receive wall covering.
- B. Wall priming: Prime and seal surfaces to be covered in accord with wall covering manufacturer's printed instructions, to permit ultimate removal of wall covering without damaging wall surface.
- C. Wall covering:
  1. Place panels consecutively in order cut from rolls, including filling of spaces above or below openings.
  2. Apply adhesive in accord with manufacturer's product data. Install seams plumb, at least 6" away from corners. Horizontal seams will not be permitted.
  3. Place continuous around internal and external corners, except where pattern or color changes at corners. Overlap seams and double cut. Roll, brush, or use broad knife to remove air bubbles, wrinkles, and blisters.
  4. Trim selvages to ensure color uniformity and pattern match at seams.
  5. Cut evenly to edges of outlet box or support.
  6. Remove excess adhesive along finished seams using warm water and clean sponge; wipe dry.
  7. Install with complete substrate bond, smooth, clean, and without wrinkles, gaps, or overlaps.
  8. Use indicated material to cover switchplates and wall plates occurring in wall covering field; match to pattern to be inconspicuous.
- D. Trim shapes: Install in accord with trim manufacturer's installation instructions.
- E. Replace previously removed surface mounted fixtures and covered switchplates and wall plates.

**SECTION 09810     PAINTS**

**PART 1 - GENERAL**

**1.01    SUMMARY**

**A. Section includes:**

1. Painting, staining, or otherwise finishing all exposed exterior and interior surfaces not already coated with decorative finish or scheduled to receive other finishes specified in Division 09; primed finish surfaces do not constitute decorative finish. Items indicated below in Article 3.02, "Coating application" Paragraph and in Specification Sections do not require painting.
2. Touching up shop applied prime coats.
3. Surface preparation and verification required to receive finishes.
4. Priming and back priming exterior finish carpentry.
5. Finishing millwork.
6. Touching up damaged, prefinished items.

**1.02    SUBMITTALS**

**A. Product data:**

1. Complete list of products for use; indicate compliance with:
  - a. Mercury-free composition requirements.
  - b. VOC limits, when mixed and thinned.
  - c. Indicate lead content.
2. Indicate manufacturer, brand name, quality, and type paint for each surface to be finished.
3. Additional requirements:
  - a. Article 2.01, Paragraph A, Subparagraph 1 indicated manufacturer's prepared product comparison guide indicating all specified paints and stains.
  - b. Correlate to specified item if from other manufacturer than standard of quality specified item; use standard of quality manufacturer's product comparison guide.
  - c. Specified manufacturer's data sheets for specified products.
  - d. Submit proposed and submitted manufacturer's data sheets as, and if, allowed in PART 2; include product cross-referencing.
4. *Manufacturer's Safety Data Sheets, (M.S.D.S.), for materials.*

**B. Samples:**

1. Colors: Color sample sets for color verification of indicated colors.
2. Brush-outs:
  - a. Prepare actual brush-out samples for each color paint, stain, or finish specified and indicated.
  - b. Submit in duplicate; minimum size, 120 SI.
  - c. Apply products in number of coats specified for actual work.
  - d. Use following substrates for brush-outs:
    - 1) Actual substrates for paint finish.
    - 2) Actual species and grade of wood specified for transparent finish.

**C. Quality control submittals:**

1. Certificates:
  - a. Indicate interior paints and stains are mercury-free.
  - b. Indicate lead content. Lead content in excess of 0.06% by weight of nonvolatile content calculated as lead metal is prohibited.
  - c. Indicate compliance with applicable VOC limits when mixed and thinned.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Acceptable manufacturers:

1. Products specified as standard of quality are manufactured by ICI - Dulux Paints/Devoe Coatings, except as otherwise noted.
  - a. Using manufacturer listed below requires additional submittal requirements listed in SUBMITTAL Article, "Product data" Paragraph.
  - b. Use product comparison chart next higher listed quality paint and stain in cases where below listed and submitted manufacturer does not have a straight line cross-referenced product to specified product.
2. Products of manufacturers listed below meeting or exceeding indicated standards, specified manufacturer's product data characteristics, color selection, and solids, except as modified below, are acceptable for use, subject to approval of product list, colors, and samples.
  - a. Paints:
    - 1) Benjamin Moore Company.
    - 2) Devoe and Raynolds Company, Inc.
    - 3) Duron, Inc.
    - 4) Porter International.
    - 5) PPG Industries Inc.
    - 6) Sherwin-Williams Company.
  - b. Coatings:
    - 1) Ameron Protective Coatings Division.
    - 2) Courtaulds Coatings, Inc.
    - 3) PPG Industries Inc.
    - 4) Sherwin-Williams Company.
    - 5) Tnemec Company, Inc.

#### B. Furnish saint, stain, and coating system colors and products as listed in the Owner's Finish Schedule.

#### C. Miscellaneous materials:

1. Paint thinners and tints: Products of same manufacturer as paints or approved by paint manufacturer for use with his products.
2. Shellac, turpentine, patching compounds, and similar materials: Pure, best quality products.
3. Mildewcide paint additive for paints and stains not already containing mildewcide:
  - a. Acceptable product: Enviro-Chem, Inc.; Stay-Clean I/E.
  - b. Characteristics: 50.0% 2-(4-thiazolyl) Benzinidazole; EPA Registration #10445-76-47332.
4. Insecticide paint additive for exterior paints and stains:
  - a. Acceptable product: Enviro-Chem, Inc.; CPF-2D.
  - b. Characteristics: 87% Diazinon; EPA Registration #47332-4.

#### D. Colors and gloss:

1. Colors:
  - a. Indicated in color schedule.
  - b. Match colors indicated in Interior Finish Schedule.
2. Gloss, minimum, unless otherwise indicated:
  - a. Walls: Low luster or eggshell.
  - b. Ceilings, soffits, and other horizontal surfaces: Flat.

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## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of conditions: Verify gypsum board surfaces have been finished in accord with "Level #" requirements specified in Gypsum Board Assemblies Section for finish level indicated.

### **3.02 PREPARATION**

- A. Protection:
1. Cover finished work specified in other sections, surfaces not being painted concurrently, and prefinished items.
  2. Applying materials in spaces where dust is being generated is prohibited.
  3. Verify surfaces to receive finishes are dry, free of debris, dust, or other deleterious materials.
  4. Remove hardware, accessories, device plates, lighting fixtures, factory finished work and similar items or provide protective covering and masking over items prior to surface preparation and painting work. Store items removed for reinstallation after completion of painting.

### **3.03 APPLICATION**

- A. Substrate preparation:
1. Lumber, plywood, and veneered surfaces:
    - a. Apply shellac, maximum four lb. cut, to knots, pitch, and resinous sapwood prior to application of first paint coat; seal for stain coat in accord with stain manufacturer's recommendations.
    - b. Painted surfaces: Fill nail holes, cracks, joints, and defects with spackling compound. Apply after first paint coat.
    - c. Transparent finish surfaces: Fill nail holes, cracks, and defects with wood filler matching finish color.
    - d. Sand surfaces smooth, except where rough-sawn surfaces are indicated. Dust to remove debris.
    - e. Treat mildewed surfaces with solution of one quart hypochlorite bleach, one tablespoon laundry detergent, and three quarts water. Rinse and allow to dry prior to painting.
    - f. Previously painted surfaces:
      - 1) Remove dirt, debris, and chalking by washing with detergent and water or low pressure cold water spray.
      - 2) Dull glossy surfaces by light sanding.
      - 3) Remove loose paint and blisters by scraping and sanding.
      - 4) Fill holes and defects.
  2. Gypsum board: Fill narrow, shallow cracks and small holes with patching plaster or non-shrinking spackling compound. Allow to dry; sand smooth without raising gypsum board paper nap.
  3. Galvanized metal: Wash with xylol to remove grease, oil, and contaminants; wipe dry with dry cloth.
  4. Ferrous metals, not primed: Solvent clean in accord with SSPC-SP-1, Solvent Cleaning, to remove grease, oil, and contaminants; power tool clean surfaces in accord with SSPC-SP-3, Power Tool Clean, minimum. Wipe dry with dry cloth. Apply primer specified in SCHEDULES Article below to pin hole free.

5. Shop primed metals, ferrous, galvanized, and non-ferrous:
  - a. Touch-up shop primer with same or compatible primer to pin hole free surface.
  - b. Using specified primer below may not be required if pin hole free shop primer is intact; verify with paint manufacturer prior to submittal time.
  - c. Severely abraded or pin holed shop primer requires preparation indicated above in "Not primed" subparagraph over entire surfaces; include surfaces concealed from view in built-in equipment where moisture is present during concrete or masonry grout cure.
  - d. Indicate specified primer requirement or non-requirement on submittal.

**B. Coating application:**

1. Apply materials
  - a. In accord with manufacturer's approved product data to achieve specified DFT.
  - b. Only when moisture content of surfaces is within manufacturer's recommended range.
  - c. Using clean brushes, rollers, or spray equipment. Limit paint spraying only to those materials recommended by manufacturer to be sprayed with no loss of performance, durability, or color.
  - d. At rate not exceeding manufacturer's recommendations for surface being coated, less normal percentage loss for each specified material.
2. Comply with manufacturer's product data for drying time between coats.
3. Sand and dust between coats to remove defects visible from 5'-0" distance.
4. Finish coats: Smooth, free of brush marks, streaks, laps or pile-up of paint, skips, or missed areas.
5. Make coating edges adjoining other materials or colors sharp and clean without overlapping.
6. Primer coats may be omitted for surfaces specified to receive factory applied primer if finish coats are compatible with primer. Substitute bond coat recommended by paint manufacturer for specified primer coat if finish coats are not compatible.
7. Refinish entire partition surface where portion of finish on gypsum board partition is damaged or unacceptable.
8. Back prime exterior finish carpentry and millwork with material specified for prime coat without runs on face; finish cut edges just prior to installation.
9. Paint inside of ductwork flat black for entire area visible through ceiling openings. Paint underside of ductwork and other above ceiling items flat black for entire area visible through ceiling openings.
10. Seal interior doors' tops and bottoms with prime coat only; side edges same as faces. Where different colors are indicated for each face, paint edges same color as face exposed when door is in open position.
11. Finish exterior door edges with same finish as exterior face.
12. Paint exposed pipes and ductwork in occupied areas same color as adjacent wall surfaces using appropriate paint system. Paint ungalvanized pipe, pipe hangers, and ferrous metal items in areas indicated below indicated as not requiring paint.
13. Paint roof top construction; include mechanical and electrical equipment, unless otherwise indicated.
14. Mask to prevent paint covering following items; remove masking at completion:
  - a. UL or WH labels on doors and frames.
  - b. Mechanical and electrical items or devices:
    - 1) Information plates.
    - 2) Plates indicating lubrication instructions.
    - 3) Moving parts specified by equipment manufacturer to be maintained in lubricated condition during operation.
  - c. Valve stems.
  - d. Lubricated or wearing surfaces.
  - e. Bright plated metal or polished stainless steel.

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- f. Sprinkler heads, sensors, and smoke detectors.
- g. HVAC control devices.
- 15. Surfaces not requiring painting:
  - a. Face brick.
  - b. EIFS.
  - c. Prefinished surfaces and items.
  - d. Concealed ductwork, conduit, and piping.
  - e. Factory painted devices or equipment not otherwise indicated to receive paint.
  - f. Surfaces within pipe chases, foundation spaces, furred areas, utility tunnels, duct shafts, and elevator shafts.

C. Quantities of coats specified below are minimums. Contractor is responsible for application of additional coats necessary to achieve required coverage and color uniformity.

### 3.04 CLEANING AND PROTECTION

- A. Upon completion of painting work, remove rubbish, debris, empty containers, rags and other discarded paint materials from site.
- B. Remove protective coverings and maskings. Reinstall hardware, accessories, device plates, lighting fixtures and similar items removed to original location, undamaged.
- C. Clean spattered paint from surfaces including glass. Do not scratch or damage adjacent finished surfaces when cleaning.
- D. Protect finished surfaces from damage throughout remainder of construction. Post warning signs to protect fresh painted surfaces.
- E. Not more than 48 hours prior to Date of Substantial Completion, touch-up and restore damaged, scratched or marred painted surfaces.

### 3.05 SCHEDULE; EXTERIOR

- A. Metals; ferrous and non-ferrous:
  - 1. Primer:
    - a. On ferrous metals: No. 4160 DEVGUARD Multipurpose Metal Primer pin hole free; 2.0 mils DFT.
    - b. On galvanized metals, stainless steel, and aluminum to pin hole free: No. 4120 DEVGUARD All-Purpose Metal & Galvanized Primer 2.0 mils DFT.
  - 2. Acrylic:
    - a. Primer: Specified above.
    - b. Gloss; two finish coats, each coat: No. 4208 DEVFLEX Waterborne Acrylic Gloss Enamel Interior/Exterior 1.5 mils DFT.
  - 3. Aliphatic polyurethane low VOC, gloss:
    - a. Primer: touch-up only on damaged surfaces required just prior to finish coats application:
      - 1) On ferrous metals: No. 235K BAR-RUST Multi-purpose Epoxy Coating 4.0 mils DFT.
      - 2) On galvanized metals and aluminum: No. 4170 DEVRAN Corrosion Resistant Epoxy Primer 4.9 mils DFT
    - b. First coat: No. 369K High Solids Urethane; 3.0 mils DFT.

### 3.06 SCHEDULE; INTERIOR

- A. Wood:
1. Acrylic, semi-gloss; two finish coats, each coat: No. 4206 DEVFLEX Waterborne Acrylic Semi-Gloss Enamel 1.6 mils DFT.
  2. Acrylic, gloss; two finish coats, each coat: No. 4208 DEVFLEX Waterborne Acrylic Gloss Enamel 1.6 mils DFT.
  3. Transparent finish on closed grain:
    - a. First coat: No. 1700 WOODPRIDE Oil Wood Stain.
    - b. Second coat: No. 1808 WOODPRIDE Waterborne Clear Gloss Waterborne Polyurethane; 1.3 mils DFT.
    - c. Third coat: No. 1802 WOODPRIDE Waterborne Clear Satin Polyurethane; 1.3 mils DFT.
  4. Transparent finish on open grain:
    - a. First coat: No. 1700 WOODPRIDE Oil Wood Stain.
    - b. Second coat: Wood Filler.
    - c. Third coat: No. 1908 WOODPRIDE Clear Gloss Polyurethane; 1.3 mils DFT.
    - d. Fourth coat: No. 1802 WOODPRIDE Waterborne Clear Satin Polyurethane; 1.3 mils DFT.
- B. Gypsum board:
1. Latex:
    - a. Flat; two finish coats, each coat: No. 1210 ULTRA-HIDE® Latex Flat Wall Paint 1.4 mils DFT.
    - b. Eggshell; two finish coats, each coat: No. 1412 ULTRA-HIDE® Eggshell Interior Wall & Trim Enamel; 1.4 mils DFT.
  2. Acrylic, gloss; two finish coats, each coat: No. 1408 DULUX PROFESSIONAL Waterborne Acrylic Interior Wall & Trim Enamel Gloss 1.6 mils DFT.
  3. Epoxy polyester:
    - a. Primer: No. 1060 ULTRA LATEX Vapor Barrier Primer-Sealer 1.4 mils DFT.
    - b. First coat: No. 4508 TRU-GLAZE® Chemical Resistant Epoxy Coating; 3.1 mils DFT.
- C. Metals; ferrous and non-ferrous:
1. Primer:
    - a. On ferrous metals: No. 4160 DEVGUARD Multi-Purpose T&S Primer to pin hole free; 2.2 mils DFT.
    - b. On galvanized metal and aluminum: No. 4120 DEVGUARD All-Purpose Metal & Galvanized Primer to pin hole free; 2.0 mils DFT.
  2. Acrylic, semi-gloss; two finish coats, each coat: No. 4206 DEVFLEX Waterborne Acrylic Semi-Gloss Enamel 1.6 mils DFT.
  3. Acrylic, gloss; two finish coats, each coat: No. 4208 DEVFLEX Waterborne Acrylic Gloss Enamel 1.6 mils DFT.
  4. Aliphatic polyurethane low VOC, gloss:
    - a. Primer:
      - 1) On ferrous metals: No. 235K BAR-RUST Multi-purpose Epoxy Coating 4.0 mils DFT.
      - 2) On galvanized metals and aluminum: No. 4170 DEVRAN Corrosion Resistant Epoxy Primer 4.9 mils DFT
    - b. First coat: No. 369K High Solids Urethane; 3.0 mils DFT.

#### **SECTION 09910. EXTERIOR COATING AND FINISH SYSTEMS**

- A. The base bid is to include an exterior coating system by Dryvit System, Inc. of One Energy Way, P.O. Box 1014, West Warwick, RI 02893, (401) 822-4100. A sample must be submitted to Owner for color verification and approved prior to any application.



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- B. Any exterior coating system used shall have a 10 year warranty from the manufacturer, and it shall be so stated in the contract. STO and Finestone are accepted alternate manufacturers with comparable systems per this specification.
- C. Any exterior coating system used shall be installed in strict accordance to the manufacturer's specifications and recommendations. Dated current specifications, installation requirements, and product descriptive data are to be submitted to the Owner and Architect for approval prior to installation.
- D. Any exterior coating system used shall have a five year warranty from the manufacturer and applicator. All exterior polystyrene insulation is to be adhered to Dens Glass plywood sheathing with mastic per manufacturer's specifications AFTER water proofing spray has been applied.
- E. The exterior coating system installer must take special precautions at the time of application. In the event the windows, doors and frames, heating and ventilating units and grilles are installed before the exterior coating system is applied and if there is any possibility of the coating system coming in contact with any of these items by accident or design and may cause any type of detrimental effect, these items must be covered and protected by this contractor. In the event damage or staining occurs, it will be this contractor's financial responsibility to do what is necessary to rectify the damage to the satisfaction of the Architect.
- F. The coating installer by starting to apply the insulation has effectively accepted the quality of the substrate, and the warranty of the coating and its application is therefore in effect. If the applicator has any problems with the substrate whatsoever, it is the applicator's responsibility to inform the Contractor and the Owner.

## 8.0 GENERAL

### 8.1 RELATED DOCUMENTS

- A. The General Conditions, Supplementary Conditions and applicable provisions of Division 1 are hereby made a part of this Section as fully as if repeated herein.

### 8.2 WORK OF THIS SECTION

- A. Provide all labor, materials and equipment necessary to install the field-applied exterior insulation and finish system (EIFS) herein described. STO and the "Dryvit System" are used as base specifications, but other manufacturers of similar systems will be considered if they can show equivalency or superiority to the base specification.

## 9.0 PRODUCTS

- A. EIFS Primus/Adhesive: An acrylic-based product as manufactured by Dryvit System, Inc.
- B. G.P. Dens Glass sheathing shall be 5/8" thick exterior grade.
- C. EIFS insulation board, thickness as specified on drawings.

D. EIFS Reinforcing Mesh Fabric: Balanced open weave glass fiber fabric made from twisted multi-end strands, specifically treated for compatibility with EIFS materials.

E. Dryvit Outsulation Plus insulation information attached.

Dryvit Quarzputz Finish: As manufactured by Dryvit System, Inc. Color as per approved sample (Manor White #108), to be selected by Owner. Dryvit Primus/Adhesive and Dryvit Quarzputz finish shall be stored at temperatures not less than 40° F. No additives such as rapid binders, anti-freeze, accelerators, etc. shall be added to any in ambient temperatures less than 40° F., supplementary heat shall be provided. A minimum ambient temperature of 40° F. shall be maintained for at least 24 hours after installation. Subsequent to installation, the walls shall remain free of residual moisture. Exterior coating supplier to provide 5 gallons of extra EIFS coating at job site when job is complete.

F. Trim and Colors: See drawings for all colors and textures.

G. Expansion Provisions: If required, fabricate panels and fascia to allow controlled expansion in running lengths not only for movement of components in relationship to one another but also to adjoining dissimilar materials, including masonry and concrete, in a manner which is sufficient to prevent water leakage, deformation or damage. Expansion joint direction and location as approved by Architect.

## 10.0 EXECUTION

### 10.1 INSTALLATION

A. Preparation of the Wall Surface: All materials in this section are to be installed by approved EIFS applicators. The surface shall have no planer irregularities greater than 1/4." The surface to be covered shall be sound, free of hot spots, releasing agents (silicones, oils, etc.) and other residue.

B. Applying Air and Water Resistive Barrier: Use product such as STO Guard or Dryvit Outsulation. See attached information.

C. Mixing EIFS Primus/Adhesive: Use clean container, free of all foreign substance, for mixing and preparing material. Mix Type I Portland Cement with Primus/Adhesive in a ratio, by volume, of one part fresh Portland Cement to one part Primus/Adhesive. This mixed Primus/Adhesive shall be used for insulation board adhesive and Primus coating. Pot life for mixed Primus/Adhesive is the same as ordinary mortar or plaster materials. Keep container closed when not in use.

D. Applying EIFS Insulation Board: EIFS insulation board shall be applied with its joints offset with respect to substrate joints using a running bond pattern. Joints shall be staggered and interlocked at the corners. Installation and application shall be in accordance with manufacturer's latest directions and specifications.

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- E. EIFS Primus Coating and Reinforcing Fabric: Using a stainless steel trowel, apply mixed EIFS Primus/Adhesive to the entire surface of the insulation board to a uniform thickness of approximately 1/16 ". For this use water may be mixed with the mixed Primus/Adhesive to enhance workability. Immediately place the reinforcing fabric against the wet Primus coating, and by troweling from the center to the edges, embed the fabric into the coating. Reinforcing fabric shall be continuous at corners and lapped not less than 2-1/2" at fabric edges. Avoid wrinkles in embedding the reinforcing fabric. The finished thickness of the Primus coating shall be such that the reinforcing fabric is fully embedded.
- F. EIFS Quarzputz Finish: Thoroughly mix the factory prepared Quarzputz Finish material with the high speed mixer until a uniform workable consistency is attained. Clean water may be added to adjust workability to suit. Using a clean stainless steel trowel, apply a tight coat of the Quarzputz Finish directly to the reinforced Primus coating. The final texture and thickness is achieved by allowing the trowel to roll on the round aggregate using a variety of motions and trowels or floats to create the particular EIFS Finish specified. Final finish as approved by the Architect.
- F. The final thickness shall be not greater than the diameter of the largest aggregate of the Quarzputz Finish material.
- G. Installation and application of materials shall be in accordance with the latest printed instructions issued by the manufacturer and shall be executed only by tradesmen, highly skilled in this field.

## 10.2 CLEAN UP

- A. Clean all work areas at completion of exterior insulation and finish systems work, or as required by General Contractor. Leave work area in a broom clean condition.

## 10.3 GUARANTEE

- A. This subcontractor shall furnish a guarantee covering the labor for a period of one (1) year from the date of the building opening in a form acceptable to the Owner and the Architect.

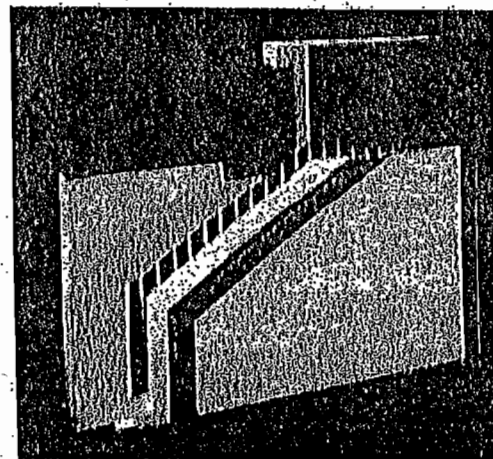
## 10.4 ALTERNATE

- A. If the Owner grants permission in writing, the only alternate accepted for the exterior coating system shall be: Synergy, Finestone, or Parex. An actual field-prepared sample with the specified texture and required color must be submitted to the architect/owner, through the architect, for review. Manufactured samples will not be accepted. In addition, the manufacturer's published product literature must be included with the field-prepared sample. This submittal must be accompanied by a review letter from the architect verifying that the product being submitted is equal to or better than the Dryvit product specified.

## **Outsulation® Plus System (DS445)**

The High-Performance Moisture Drainage EIF System  
That Incorporates An Air and Water-Resistive Barrier  
(Printer Friendly Version In PDF)

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- [System Components](#)
- [Efficient and Economical](#)
- [Why Backstop NT?](#)
- [Dryvit...Proven For Over 35 Years](#)
- [Warranty](#)
- [Dryvit Systems Accessories](#)
- [Flashing Tape, Flashing Tape Surface Conditioner, Grid Tape](#)



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### **Summary**

Dryvit offers a family of performance-based systems that allows architects and owners to meet the specific demands of any given project. Dryvit's original Outsulation® System has been installed on over 350,000 buildings worldwide. Today, due to the increased demands for a wall system to be able to drain away incidental moisture, the Outsulation concept has grown into a family of related systems, each building upon the other to achieve specific performance goals:

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### **System Components**

1. Backstop® NT Air/Water-Resistive Barrier Coating (available in Texture or Smooth)
2. Dryvit Grid Tape
3. Dryvit AquaFlash™ System or Flashing Tape™ and Surface Conditioner™
4. Dryvit Drainage Track™ (Shown) or Dryvit Drainage Strip™ adhered with Dryvit AP Adhesive®
5. Dryvit Adhesive in vertical notched trowel configuration
6. Insulation Board
7. Dryvit Reinforced Base Coat
8. Dryvit Finish

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### **Efficient and Economical**

Outsulation Plus expands upon the proven weatherability and insulating qualities of Outsulation by adding a second line of defense against air, moisture and weather. This is accomplished with a coating of Backstop NT and by applying Dryvit's AquaFlash System or flashing tape at all sills of openings. Outsulation Plus goes one step further through the use of adhesive channels to provide moisture drainage. These channels work in tandem with either of two system termination options, resulting in an efficient and economical system that is easy to install.

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### **Why Backstop NT?**

The adhesive channels present in Outsulation Plus will evacuate incidental moisture that may find its way behind the insulation board. Backstop NT prevents this moisture from coming into contact with the substrate as it drains. Developed specifically for this purpose, it is a specially formulated, flexible, polymer-based, noncementitious coating that provides a watertight membrane. Always used in conjunction with a waterproof flashing material such as Dryvit AquaFlash System or flashing tape, Backstop NT is an essential element of the Outsulation Plus System. Full details regarding the performance of Backstop NT are available upon request.

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### **Dryvit...Proven For Over 35 Years**

Dryvit Systems, Inc. is an ISO 9001:2000 certified company. ISO standards have been established worldwide as a common denominator for product excellence. Dryvit is the recognized leader in EIFS technology. With leadership comes an obligation and commitment to research and development. The Outsulation Plus System is an example of our determination to continuously evaluate market demands and develop new and exciting products.

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# OUTSULATION<sup>®</sup> PLUS



An Exterior Wall Insulation and Finish System  
With A Secondary Weather Resistive Barrier

DS137

## Outsulation Plus Specifications

**DRYVIT SYSTEMS, INC.  
MANUFACTURER'S SPECIFICATION  
SECTION 07240  
OUTSULATION® PLUS SYSTEM  
EXTERIOR INSULATION AND FINISH SYSTEM CLASS PB**

**PART I GENERAL**

**1.01 SUMMARY**

- A. This document is to be used in preparing specifications for projects utilizing the Dryvit Outsulation Plus System. For complete product description and usage refer to:
1. Dryvit Outsulation Plus Data Sheet, DS445.
  2. Dryvit Outsulation Plus System Application Instructions, DS218.
  3. Dryvit Outsulation Plus System Installation Details, DS110.

**1.02 SYSTEM DESCRIPTION**

- A. The Dryvit Outsulation Plus System is an Exterior Insulation and Finish System (EIFS), Class PB, consisting of a water-resistive barrier coating (air/weather barrier), Dryvit adhesive, expanded polystyrene insulation board, Dryvit base coat, Dryvit reinforcing mesh and Dryvit finish.
1. Design Requirements:
    - a. Acceptable substrates shall include:
      - 1) Exterior grade gypsum sheathing meeting ASTM C 79 requirements for water resistant core or Type X core at the time of application of the Outsulation Plus System.
      - 2) Exterior grade gypsum sheathing surfaced with inorganic fiberglass mats meeting ASTM C 1177.
      - 3) Exterior fiber reinforced cement or calcium silicate boards.
      - 4) APA Exterior or Exposure 1 Rated Plywood Grade C-D or better, nominal 13 mm (1/2 in) minimum 4-ply.
      - 5) Unglazed brick, cement plaster, concrete or concrete masonry.
    - b. Deflection of the substrate systems shall not exceed 1/240 times the span.
    - c. The substrate shall be flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.
    - d. The slope of inclined surfaces shall not be less than 6:12, and the length shall not exceed 305 mm (12 in).
    - e. All zones requiring an impact resistance classification higher than Level 1, as defined by EIMA Standard 101.86, shall be detailed in the drawings and described in the contract documents. Refer to Section 1.02.A.2.b.3 of this specification.
    - f. Expansion Joints:
      - 1) Design and location is the responsibility of the designer. As a minimum, expansion joints are required at the following locations:
        - a) Where expansion joints occur in the substrate system.
        - b) Where building expansion joints occur.
        - c) At floor lines in wood frame construction.
        - d) At floor lines of buildings where significant movement is expected.
        - e) Where the Outsulation Plus System abuts dissimilar materials.
        - f) Where the substrate type changes.
        - g) Where prefabricated panels abut one another.
        - h) In continuous elevations at intervals not exceeding 23 m (75 ft) measured horizontally.
        - i) Where significant structural movement occurs, such as changes in roof line, building shape or structural system.
    - g. Terminations
      - 1) The system shall be held back from adjoining materials around penetrations such as windows, doors, and mechanical equipment a minimum of 19 mm (3/4 in) for sealant application. See Dryvit's Outsulation Plus System Installation Details, DS110.
      - 2) The system shall be terminated a minimum of 200 mm (8 in) above finished grade.
    - h. Sealants
      - 1) Shall be manufactured and supplied by others.
      - 2) Shall be compatible with the Outsulation Plus System materials. Refer to current Dryvit publication DS153 for listing of sealants tested by sealant manufacturers for compatibility.
      - 3) Sealant backer rod shall be closed cell.

i. Vapor Retarders

- 1) Use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with local building code requirements. The type and location shall be noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain areas and can result in condensation within the wall assembly.
- j. The use of dark colors must be considered in relation to wall surface temperature as a function of local climatic conditions. Use of dark colors in high temperature climates can affect the performance of the system.

2. Performance Requirements

a. The Outsulation Plus System shall have been tested for durability as follows:

- 1) Abrasion Resistance: ASTM D 968; no deleterious effects after 500 liters (132 gal).
- 2) Absorption, Freeze-Thaw: 60 cycles, soak at 20 °C (68 °F) for four days, then -10 °C (14 °F) for two hours, then 20 °C (68 °F) for two hours; no checking, cracking, or splitting.
- 3) Accelerated Weathering: ASTM G 23 (Federal Test Standard 141A Method 6151), ASTM G 155: Cycle 1; 2000 hours. No deterioration.
- 4) Mildew Resistance: ASTM D 3273; passes.
- 5) Moisture Resistance: ASTM D 2247 (Federal Test Standard 141A Method 6201); no deleterious effects after 14 days.
- 6) Salt Spray Resistance: ASTM B 117 Federal Test Standard 141A Method 6061; 5% concentration for 300 hours. No deleterious effects.
- 7) Air Leakage: ASTM E 283; less than 0.609 l/min/m<sup>2</sup> (.002 cfm/ft<sup>2</sup>) classified as a Type III air barrier as defined by the National Research Council of Canada.
- 8) Water Penetration: ASTM E 331; no water penetration.
- 9) Drainage: ASTM E 2273; greater than 90% drainage efficiency.
- 10) Water Vapor Transmission: ASTM E 96 Procedure B; Standard lamina: 10 g/hr·m<sup>2</sup> (14 gr/hr·ft<sup>2</sup>).

b. The Outsulation Plus System shall have been tested for structural performance as follows:

- 1) Tensile Bond Strength: ASTM C 297
  - a) Backstop® NT to exterior grade gypsum sheathing: substrate failure.
  - b) Backstop NT to DensGlass Gold®: substrate failure.
  - c) Backstop NT to cement board: 523.7 kPa (76 psi), substrate failure.
  - d) Primus® to Backstop NT: Minimum 268.8 kPa (39 psi).
  - e) Genesis® to Backstop NT: Minimum 213.6 kPa (31 psi).
- 2) Full Scale Structural Tests: ASTM E 330; minimum failure load under positive or negative load of 4.3 kPa (90 psf) unless otherwise specified; substrate failure.
- 3) Impact Resistance: In accordance with EIMA Standard 101.86. Refer to table below: Panzer® Mesh used in conjunction with Standard™ Mesh is recommended for areas exposed to high traffic.

| Reinforcing Mesh/Weight<br>g/m <sup>2</sup> (oz/ft <sup>2</sup> ) | Minimum Tensile<br>Strengths | EIMA Impact<br>Classification | EIMA Impact Range<br>Joules | EIMA Impact Range<br>(In-lbs) | Impact Test Results<br>Joules (In-lbs) |       |
|-------------------------------------------------------------------|------------------------------|-------------------------------|-----------------------------|-------------------------------|----------------------------------------|-------|
| Standard - 146 (4.3)                                              | 27 g/cm (150 lbs/in)         | Level 1                       | 3-6                         | (25-49)                       | 4                                      | (36)  |
| Standard Plus™ - 203 (6)                                          | 36 g/cm (200 lbs/in)         | Level 2                       | 6-10                        | (50-89)                       | 6                                      | (56)  |
| Intermediate® - 407 (12)                                          | 54 g/cm (300 lbs/in)         | Level 3                       | 10-17                       | (90-150)                      | 12                                     | (108) |
| Panzer® 15 * - 509 (15)                                           | 71 g/cm (400 lbs/in)         | Level 4                       | >17                         | (>150)                        | 18                                     | (162) |
| Panzer 20 * - 695 (20.5)                                          | 98 g/cm (550 lbs/in)         | Level 4                       | >17                         | (>150)                        | 40                                     | (352) |
| Detail® Short Rolls - 146 (4.3)                                   | 27 g/cm (150 lbs/in)         | n/a                           | n/a                         | n/a                           | n/a                                    | n/a   |
| Corner Mesh™ - 244 (7.2)                                          | 49 g/cm (274 lbs/in)         | n/a                           | n/a                         | n/a                           | n/a                                    | n/a   |

\*Shall be used in conjunction with Standard Mesh

c. The Outsulation Plus System shall have been tested for fire performance as follows:

- 1) Surface Burning Characteristics: ASTM E 84:
  - a) The EPS insulation board shall have a flame spread index not exceeding 25 and a smoke developed index not exceeding 450.
  - b) The adhesives and coatings shall have a flame spread index not exceeding 20 and a smoke developed index not exceeding 10.
- 2) ASTM E 108 (Modified) Full Scale Fire Test; passed.
- 3) NFPA 285 (UBC 26-9) Intermediate Scale Multi-Story Test (ISMA); passed.
- 4) Ignitability Characteristics: NFPA 268; passed.



**1.03 SUBMITTALS**

- A. Product Data: The contractor shall submit to the owner/architect the manufacturer's product data describing the products, which will be used on the project.
- B. Shop Drawings for Panelized Construction: The panel fabricator shall prepare and submit to the owner/architect complete drawings showing: wall layout, connections, details, expansion joints, and installation sequence.
- C. Samples: The contractor shall submit to the owner/architect two (2) samples of the Outsulation Plus System for each finish, texture and color to be used on the project. Samples shall be of sufficient size to accurately represent each color and texture being utilized on the project.
- D. Test Reports: When requested, the contractor shall submit to the owner/architect copies of selected test reports verifying the performance of the Outsulation Plus System.

**1.04 QUALITY ASSURANCE**

**A. Qualifications**

- 1. System Manufacturer: Shall be Dryvit Systems, Inc.
- 2. Material shall be manufactured at a facility covered by a current ISO 9001:2000 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
- 3. Contractor: Shall be knowledgeable in the proper installation of the Dryvit Outsulation Plus System and shall be experienced and competent in the installation of Exterior Insulation and Finish Systems. Additionally, the contractor shall possess a current Outsulation Plus System Trained Contractor Certificate\*\* issued by Dryvit Systems, Inc.
- 4. Insulation Board Manufacturer: Shall be licensed by Dryvit Systems, Inc., shall be capable of producing the Expanded Polystyrene (EPS) in accordance with the current Dryvit Specification for Insulation Board, DS131; and shall subscribe to the Dryvit Third Party Certification and Quality Assurance Program.
- 5. Panel Fabricator: Shall be a contractor experienced and competent in the fabrication of architectural wall panels.
- 6. Panel Erector: Shall be experienced and competent in the installation of architectural wall panel systems and shall be:
  - a. The panel fabricator
  - b. An erector approved by the panel fabricator
  - c. An erector under the direct supervision of the panel fabricator

**B. Regulatory Requirements:**

- 1. The EPS shall be separated from the interior of the building by a minimum 15-minute thermal barrier.
- 2. The use and maximum thickness of EPS shall be in accordance with the applicable building codes.

**C. Certification**

- 1. The Outsulation Plus System shall be recognized for the intended use by the applicable building code(s).

**D. Mock-Up**

- 1. The contractor shall, before the project commences, provide the owner/architect with a mock-up for approval.
- 2. The mock-up shall be of suitable size as required to accurately represent each color and texture to be utilized on the project.
- 3. The mock-up shall be prepared with the same products, tools, equipment and techniques required for the actual applications. The finish used shall be from the same batch as is being used for the project.
- 4. The approved mock-up shall be available and maintained at the jobsite.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. All materials shall be delivered to the job site in the original, unopened packages with labels intact. Questionable materials shall not be used.
- B. Minimum storage temperature shall be 7 °C (45 °F) for Demandit®, Revyvit®, and Color Prime™; 10 °C (50 °F) for Ameristone™ and 4 °C (40 °F) for other wet products. For Custom Brick™ finish, refer to Custom Brick Polymer Specification, DS151.
- C. Protect all products from weather and direct sunlight.

**1.06 PROJECT CONDITIONS**

- A. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
- B. Application of wet materials shall be at a minimum ambient temperature of 4 °C (40 °F), 7 °C (45 °F) or 10 °C (50 °F) depending on product and rising. For Custom Brick finish, refer to Custom Brick Polymer Specification, DS151. These temperatures shall be maintained for a minimum of 24 hours (for Ameristone 48 hours), thereafter, or until completely dry.

**1.07 SEQUENCING AND SCHEDULING**

- A. Installation of the Dryvit Outsulation Plus System shall be coordinated with other construction trades.

**1.08 WARRANTY**

- A. Dryvit Systems, Inc. shall provide a written moisture drainage and limited materials warranty against defective material upon written request. Dryvit shall make no other warranties, expressed or implied. Dryvit does not warrant workmanship. Full details are available from Dryvit Systems, Inc.
- B. The applicator shall warrant workmanship separately. Dryvit shall not be responsible for workmanship associated with installation of the Outsulation Plus System.

**1.09 DESIGN RESPONSIBILITY**

- A. It is the responsibility of both the specifier and the purchaser to determine if a product is suitable for its intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings and the like. Dryvit has prepared guidelines in the form of specifications, application details, and product sheets to facilitate the design process only. Dryvit is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Dryvit or otherwise, or for any changes which purchasers, specifiers, designers, or their appointed representatives may make to Dryvit's published comments.

**1.10 MAINTENANCE**

- A. Maintenance and repair shall follow the procedures noted in the Dryvit Outsulation Plus System Application Instructions, DS218.
- B. All Dryvit products are designed to minimize maintenance. However, as with all building products, depending on location, some cleaning may be required. See Dryvit publication DS152 on Cleaning and Recoating.
- C. Sealants and Flashings shall be inspected on a regular basis and repairs made as necessary.

**PART II PRODUCTS**

**2.01 MANUFACTURER**

- A. All components of the Outsulation Plus System shall be obtained from Dryvit or its authorized distributors.

**2.02 MATERIALS**

- A. Dryvit water-resistive barrier coating (air/weather barrier): Provides an air and water barrier for the substrates listed Section 1.02.A.1.a and includes the following components:
1. Dryvit Backstop NT: A noncementitious polymer product available in Texture and Smooth.
  2. Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive.
  3. Dryvit Flashing Tape™: A high density, polyethylene backed tape with a rubberized asphalt adhesive.
  4. Dryvit Flashing Tape Surface Conditioner™: A water-based surface conditioner and adhesion promoter for the Dryvit Flashing Tape.
- B. Dryvit AP Adhesive™: A moisture cured urethane based adhesive used to adhere the Dryvit Drainage Strip and Drainage Track.
- C. Drainage Track: UV treated PVC perforated "J" channel with weep holes, complying with ASTM D 1784 and ASTM C 1063. Shall be one of the following:
1. Starter Trac STWP – without drip edge by Plastic Components, Inc.
  2. Starter Trac STDE – with drip edge by Plastic Components, Inc.
  3. Universal Starter Track by Wind-lock Corporation
  4. Sloped Starter Strip with Drip by Vinyl Corp.
- D. Dryvit Drainage Strip™: A corrugated plastic sheet material, which provides drainage.
- E. Adhesives/Base Coats: Used to adhere the insulation board to the air/weather barrier and to embed the reinforcing mesh on the face of the insulation board. Shall be one of the following:
1. Genesis: A fiber-reinforced, acrylic modified product, which is field mixed with Portland cement in a 1:1 ratio by weight.
  2. Genesis® DM: A dry mix, polymer-based, fiber-reinforced product, which is field mixed with water.
  3. Genesis® FM: A fiber-reinforced, acrylic modified product specifically formulated for use in Dryvit's Factory Mutual Approved System. The product is mixed with Portland cement in a 1:1 ratio by weight.
  4. Primus: An acrylic polymer-based product, which is field mixed with Portland cement in a 1:1 ratio by weight.
  5. Primus® DM: A dry mix, polymer-based product, which is field mixed with water.
  6. Dryflex®: A high percentage polymer-blend material, which is field mixed with Portland cement in a 1:1 ratio by weight.

## Outsulation Plus System Specifications

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- F. Insulation Board: Expanded Polystyrene meeting the Dryvit Specification for Insulation Board, DS131.
1. Thickness of insulation board shall be minimum 25 mm (1 in).
  2. The insulation board shall be manufactured by a board supplier licensed by Dryvit Systems, Inc.
- G. Dryvit Reinforcing Mesh: Shall be a balanced, open weave, glass fiber fabric treated for compatibility with other system materials. NOTE: Reinforcing meshes are classified by impact resistance and specified by weight and tensile strength as listed in Section 1.02.A.2.b.3.
- H. Dryvit Finish: Shall be the type, color and texture as selected by the owner/architect and shall be one or more of the following:
1. Standard DPR (Dirt Pickup Resistance): Water-based, acrylic coatings with integral color and texture and formulated with DPR chemistry:
    - a. Quarzputz® DPR: Open-texture pattern
    - b. Sandblast® DPR: Medium texture
    - c. Freestyle® DPR: Fine texture
    - d. Sandpebble® DPR: Pebble texture
    - e. Sandpebble® Fine DPR: Fine pebble texture
  2. E Finishes™: Water-based, lightweight acrylic coatings with integral color and texture and formulated with DPR chemistry:
    - a. Quarzputz® E
    - b. Sandpebble® E
    - c. Sandpebble® Fine E
  3. Factory Mutual Finishes: Water-based, acrylic coatings with integral color and texture, formulated with PMR chemistry:
    - a. Quarzputz® FM
    - b. Sandblast® FM
    - c. Sandpebble® FM
    - d. Sandpebble® Fine FM
  4. Specialty Finishes
    - a. Ameristone: Multi-colored quartz aggregate.
    - b. Stone Mist®: Ceramically colored quartz aggregate.
    - c. Custom Brick Finish: Acrylic polymer finish used in conjunction with a proprietary template system to create the look of stone, brick, slate or tile.
    - d. TerraNeo®: 100% acrylic-based finish with large mica chips and multi-colored quartz aggregates.
    - e. Limestone™: A premixed, 100% acrylic-based finish designed to replicate the appearance of limestone blocks.
  5. Elastomeric DPR (Dirt Pickup Resistance) Finishes: Water-based, elastomeric acrylic finishes with integral color and texture and formulated with DPR chemistry:
    - a. Weatherlastic® Quarzputz
    - b. Weatherlastic® Sandpebble
    - c. Weatherlastic® Sandpebble Fine
    - d. Weatherlastic® Adobe
  6. Medallion Series PMR™ (Proven Mildew Resistance) Finishes: Water-based; acrylic finishes with integral color and texture:
    - a. Quarzputz® PMR
    - b. Sandblast® PMR
    - c. Freestyle® PMR
    - d. Sandpebble® PMR
    - e. Sandpebble® Fine PMR
  7. Coatings, Primers and Sealers:
    - a. Demandit
    - b. Weatherlastic® Smooth
    - c. Tuscan Glaze™
    - d. Revyvit
    - e. Color Prime
    - f. Prymit®
    - g. SealClear™

PART III EXECUTION

3.01 EXAMINATION

- A. Prior to installation of the Outsulation Plus System, the contractor shall verify that the substrate:
  - 1. Is of a type listed in Section 1.02.A.1.a.2. Is flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.
  - 3. Is sound, dry, connections are tight; there are no surface voids, projections, or other conditions that may interfere with the Outsulation Plus System installation.
- B. Prior to the installation of the Outsulation Plus System, the contractor shall notify the general contractor, and/or architect and/or owner of all discrepancies.
- C. The architect or general contractor shall insure that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the Outsulation Plus application.

3.02 PREPARATION

- A. The Outsulation Plus materials shall be protected by permanent or temporary means from weather and other damage prior to, during, and following application until dry.
- B. Protect adjoining work and property during Outsulation Plus installation.
- C. The substrate shall be prepared as to be free of foreign materials such as oil, dust, dirt, form release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.03 INSTALLATION

- A. The system shall be installed in accordance with the Dryvit Outsulation Plus System Application Instructions, DS218.
- B. The overall minimum base coat thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in two (2) passes.
- C. Dryvit Outsulation Plus System surfaces in contact with sealant shall be coated with Demandit or Color Prime. Sealant shall not be applied directly to textured finishes or base coat surfaces.

3.04 FIELD QUALITY CONTROL

- A. The contractor shall be responsible for the proper application of the Outsulation Plus materials.
- B. Dryvit assumes no responsibility for on-site inspections or application of its products.

3.05 CLEANING

- A. All excess Outsulation Plus System materials shall be removed from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. All surrounding areas, where the Dryvit Outsulation Plus System has been applied, shall be left free of debris and foreign substances resulting from the contractor's work.

3.06 PROTECTION

- A. The Outsulation Plus System shall be protected from weather and other damage until permanent protection in the form of flashings, sealants, etc. are installed.

DISCLAIMER

Information contained in this specification conforms to standard detail and product recommendations for the installation of the Dryvit Outsulation Plus System products as of the date of publication of this document and is presented in good faith. Dryvit Systems, Inc. assumes no liability, expressed or implied, as to the architecture, engineering or workmanship of any project. To insure that you are using the latest, most complete information, contact:

Dryvit Systems, Inc.  
One Energy Way  
P.O. Box 1014  
West Warwick, RI 02893  
(401) 822-4100

\*\* The Trained Contractor Certificate indicates certain employees of the company have been instructed in the proper application of Dryvit products and have received copies of Dryvit's Application Instructions and Specifications. The Trained Contractor Program is not an apprenticeship or endorsement. Each trained contractor is an independent company experienced in the trade and bears responsibility for its own workmanship. Dryvit Systems, Inc. assumes no liability for the workmanship of a trained contractor.

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**FINISH SCHEDULE:**

**OWNER TO PROVIDE COMPREHENSIVE INTERIOR FINISH SCHEDULE AND VARIOUS MATERIAL SAMPLES. THE FOLLOWING IS FOR BIDDING PURPOSES ONLY!**

Questions should be directed to Owner direct:

**Southern Hospitality Services LLC**  
Phone: (601) 829-9898      FAX: (601) 829-9922

The following samples must be submitted for Owner's approval prior to fabrication or application:

- \* Stain sample utilizing the actual wood species to be used for Public Area trim.
- \* Four (4) sets of paint draw down cards for all interior and exterior paints notating all formulas, base paints, vehicles and sheens. A swipe of the paint is required on the control card. Also, the Contractor is to see that the paint store retains a control batch of paint used on the property and is labeled for this particular project.
- \* Actual production run samples of tile specified in the project that Contractor will draw from for this project.
- \* Texture sample by Contractor of record utilizing actual equipment and materials to be used on project. To match the Owner's requested texture.

**DIVISION 10 SPECIALTIES****SECTION 10010. WORK INCLUDED**

- A. Furnish labor and materials to complete the work of specialty items as shown on the plans and as specified.

**SECTION 10125 VISUAL AID BOARDS****PART 1 - GENERAL**

NOT USED

**PART 2 - PRODUCTS****2.01 MANUFACTURED UNITS**

A. Acceptable products:

1. Claridge Products and Equipment, Inc.; Premiere Wood Cabinet Lecture Unit.
2. Greensteel, Inc.; Triptych Series Executive Conference Units, Wood.
3. Lemco; Executive Presentation Boards.
4. WallTalkers; NuVuRite Visual Systems.

B. Characteristics:

1. Type: Wall mounted visual display unit with two continuous piano hinged door panels; center stationary panel containing markerboard writing surface with marker and eraser storage tray; side hinged panels containing cork tackable surface.
2. Construction:
  - a. Cabinet: Red oak veneer book matched on visible surfaces with solid red oak frame and radiused corners and edges; natural lacquer finish.
  - b. Markerboard: Unit manufacturer's standard 24 gauge, minimum, enameling iron or steel with 0.003" thickness fused porcelain enamel writing surface over ground coat for liquid chalk; white color.
  - c. Accessories; furnish each unit complete with following items:
    - 1) Display rail with cork insert on each door.
    - 2) Four spring clip type map hooks per unit.
    - 3) Miscellaneous joinery pieces, clips, and fasteners for complete installation on indicated substrates.

- C. Size: 4'-0" high by 4'-0" wide.

**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Install at locations indicated, in accord with manufacturer's product data. Attach using concealed fasteners. Mount at height indicated to unit top unless otherwise indicated.
- B. Tolerances: Maintain units plumb, level, and true to line within 1/8" in unit width.

## **SECTION 10200      LOUVERS AND VENTS**

### **PART 1 - GENERAL**

#### **1.01    SYSTEM DESCRIPTION**

**A. Design requirements:**

1. Units AMCA 500-1989 tested and certified on 48" by 48" section.
2. Intake air at face area velocity: 500 FPM.
3. Pressure loss: 0.16" water gauge or less.
4. Water penetration: 0.05 ounces PSF free area for a 15 minute duration.
5. Free area: 47%.
6. Design completed louver to withstand wind pressure loads normal to wall plane indicated for both positive and negative pressures of 30 PSF, minimum; meet local code requirements if more stringent.

### **PART 2 - PRODUCTS**

#### **2.01    MANUFACTURERS**

**A. Acceptable manufacturers:**

1. Architectural louvers:
  - a. Airolite Company.
  - b. American Warming and Ventilating, Inc.
  - c. Construction Specialties, Inc.
  - d. Dowco.
  - e. Industrial Louvers, Inc.
2. Colored coating finish:
  - a. Akzo Coatings.
  - b. Morton International, Specialty Coatings Group.
  - c. PPG Industries, Inc.
  - d. Valspar.

#### **2.02    MANUFACTURED UNITS**

**A. Architectural louvers:**

1. Material: ASTM B221-90, 6063-T5 aluminum alloy, 0.081" minimum thickness.
2. Colored coating finish:
  - a. Type: System for AAMA 605.2-92 application.
  - b. Color: PPG Industries, Inc.; Bone White.
  - c. Color match touch-up finishes using Kynar or Hylar ADS PVDF formulation.
3. Construction: 4" deep, welded.
4. Blade design:
  - a. General: Stormproof with drainable blades.
  - b. Fixed extruded blades with mullions: Airolite; Model K609 Series.
5. Furnish manufacturer's standard rewireable extruded aluminum bird screen frame with 1/2" square, 14 gauge aluminum mesh.
6. Furnish manufacturer's standard rewireable extruded aluminum insect screen frame with 16X18 aluminum mesh.
7. Install blank-off panels where louver is oversized; same finish and color as louver.
8. Furnish additional structural reinforcement to meet specified loading requirements.
9. Fasteners: Stainless steel.
10. Building paper: Specified in Rough Carpentry Section.

## 2.03 FABRICATION

- A. Shop assembly:
  - 1. Fabricate units to sizes and configurations indicated on reviewed shop drawings and as follows:
    - a. Fixed blade angle at or between 35° and 40°.
    - b. Blade spacing: Not exceeding 4-1/2" O.C.
    - c. Units over 5'-0" length: Fabricate in multiple lengths with interlocking mullions. Provide intermediate blade bracing for units over 4'-0" long.
    - d. Interlocking mullions providing expansion control.
  - 2. Fabricate and assemble framing with joints only at intersections of members with uniform hairline connections; rigidly secure.
  - 3. Weld in accord with AWS recommendations or methods recommended by selected manufacturer. Conceal welds from view.
- B. Shop finishing: Prepare surfaces for specified finish; apply in accord with AAMA 605.2-92 requirements to obtain specified finish and uniform color.
- C. Tolerances:
  - 1. Material cuts: Square to 1/32" off square, maximum, over largest dimension; proportionate amount of 1/32" on other two dimensions.
  - 2. Maximum offset in alignment between two consecutive members in line, end to end: 1/64".
  - 3. Variation in squaring diagonals for assemblies: 1/16".
  - 4. Flatness for assemblies:  $\pm 1/16$ " off neutral plane.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. General: Install louvers in accord with manufacturer's product data in prepared openings, plumb and level.
- B. Attach louvers using stainless steel fasteners spaced at 1'-0" O.C. at head, sill, and jambs. Separate aluminum from dissimilar metals using one layer of building paper or apply mastic in accord with SSPC-Paint 12.
- C. Protection: Protect prefinished surfaces from damage and staining. Provide protective covering for louvers during subsequent construction.

## **SECTION 10260. ELEVATOR DOOR AND WALL & CORNER GUARDS**

- A. Elevator door frame guards:
  - b. Provide Acrovyn corner guards Type "C" DFP .028 thickness 84" high, field formed and applied with adhesive supplied by manufacturer, at elevator door frame on all floors. Color to be specified by Owner's Finish Schedule.



B. Wall and corner guards:

1. Install Acrovyn Corner Guard #SFS-20 with 1/4" corner radius, 2" face, per manufacturer's recommendations from floor to ceilings in the corridors as specified on the drawings. Final cover to be installed after completion of the drywall work. Color to be specified on Owner's finishes schedule.
2. Eliminate black trim on Acrovyn recessed corner guards. Vinyl is to wrap into corner guard frame.

**SECTION 10450. INTERCOM SYSTEM**

- A. Verify with Owner and provide bid on intercom system.

**SECTION 10520. FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES**

**PART 1 - GENERAL**

1.01 QUALITY ASSURANCE

A. Regulatory requirements:

1. Owner to furnish extinguisher units bearing UL "Listing Mark" for type, rating, and classifications of extinguishers indicated.
2. Contractor to furnish and install fire extinguisher cabinets.
3. Comply with NFPA 10-1990 requirements and local codes for placement and heights.

**PART 2 - PRODUCTS**

2.01 MANUFACTURED UNITS

A. Acceptable manufacturers:

1. Larsen Manufacturing Company.
2. Elkhart Brass Manufacturing Company.
3. J.L. Industries, Inc.
4. Norris Industries.
5. Standard Fire Equipment Div./Zurn Industries, Inc.

B. Extinguishers:

1. Multi-purpose dry chemical extinguisher:
  - a. Capacity: Ten lbs.
  - b. UL Rating: 4A-60B:C.
2. Extinguishers complete with nozzle and pressure gauge.
3. Manufacturer's standard bracket supporting extinguisher at top and bottom; holding extinguisher off finished wall surface.

C. Fire extinguisher cabinets:

1. Type: Recessed.
2. Size: Required for extinguishers.
3. Cabinet material and finish: Minimum 18 gauge steel, prefinished in white enamel.
4. Door and trim material: prefinished in white enamel.
5. Door:
  - a. Type: Duo vertical panel.
  - b. Glazing: Tempered glass.

- c. Color: Red.
  - d. Lettering: FIRE EXTINGUISHER in white pressure sensitive vinyl (PSV); lettering running vertical ascending.
  - 6. Hardware: Equip door with full-length piano hinge, roller catch, pull and key lock.
  - 7. Furnish WH certified design cabinet for use in one and two hour combustible and non-combustible wall construction meeting requirements of ASTM E814-88.
- D. Bracket mounted unit decals: Red letter decals spelling "FIRE EXTINGUISHER" for application to vertical surface above unit; letter size, style, and location in accord with NFIPA requirements.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Fire extinguisher cabinets:
  - 1. Secure in walls, plumb and level; attach to substrate in accord with manufacturer's installation instructions. Maintain wall fire rating construction integrity.
  - 2. Set at height complying with NFIPA 10-1990 and ADA requirements for extinguisher top height from finish floor; in no case more than 5'-6" to cabinet top.
  - 3. Caulk perimeter with sealant in accord with Joint Sealants Section; use UL rated sealant installation for rated construction.
- B. Brackets: Install at height complying with NFIPA 10-1990 requirements for extinguisher top height from finish floor at indicated or NFIPA 10-1990 required locations; in no case more than 5'-0" to extinguisher top.
- C. Extinguishers: Install charged extinguishers not more than 48 hours prior to Date of Substantial Completion.
- D. Identification for bracket mounted extinguishers: Install decals above each extinguisher unit in accord with NFIPA 10-1990 and ADA.

### **SECTION 10810 TOILET ACCESSORIES**

#### **PART 1 - GENERAL**

##### **1.01 SYSTEM DESCRIPTION**

- A. Design requirements: Meet ANSI A117.1 grab bar loading requirements.

#### **PART 2 - PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Toilet accessories:
  - 1. Acceptable manufacturers:
    - a. Products specified as standard of quality are manufactured by Bobrick Washroom Equipment, Inc., referred to as "Bobrick".
    - b. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to prior approval of proposed product list.
      - 1) American Specialties, Inc.
      - 2) Bradley Washfountain Company.

2. Furnish accessories as product of one manufacturer, except where certain special items are indicated. Key keyed accessories alike with exception of coin receiving boxes on vending equipment. Key vending equipment in accord with Owner's requirements.
3. Materials: Use AISI Type 304 stainless steel, (non-austenitic), for all parts except mounting kits for grab bars or specific items noted otherwise.
4. Fasteners: Toilet and bath accessory manufacturer's recommended fasteners for substrate encountered.
5. Toilet and bath accessories: Indicated on Drawings.
6. Ginger Washroom Equipment; see plans.

**B. Baby changing stations:**

1. Acceptable products:
  - a. American Infant Care Products; Diaper Deck.
  - b. American Specialties, Inc.; 9010 Baby Changing Station.
  - c. Bobrick Washroom Equipment, Inc.; #B2200 Series.
  - d. JBJ Industries, Inc.; Koala Bear Kare Baby Changing Station.
2. Characteristics:
  - a. Type: Surface mount fold down high impact FDA approved plastic unit with shaped platform for child's body.
  - b. Pneumatic gas shock assuring smooth operation of fold down platform.
  - c. Child safety strap on platform.
  - d. Furnish manufacturer's recommended wall anchors for substrates encountered.
  - e. Factory installed vandalism lock.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

**A. Verification of conditions:**

1. Verify built-in accessory plates and related items are in correct location and position.
2. Check openings scheduled to receive recessed or semi-recessed accessories for correct dimensions, depth, plumbness of blocking for frames, and preparation affecting accessories installation.

### **3.02 INSTALLATION**

**A. General:**

1. Built-in accessory plates: Furnish for installation under construction activities specified in other sections.
2. Install accessories level, plumb, in indicated locations.
3. Installation methods indicated in manufacturer's literature for substrates encountered.

**B. Mounting heights, general:**

1. Mount toilet and bath accessories where indicated.
2. If mounting heights are not indicated, mount at toilet and bath accessory manufacturer recommended height.
3. Accessory items indicated by code *"for use by the handicapped"*. Mount at height required by ANSI A117.1 and ADA; use more restrictive requirement unless otherwise indicated in case of conflict.

**C. Wall conditions, grab bars: Attach to stud wall system using accessory manufacturer supplied continuous length steel anchor plate and mounting kits at indicated locations on grab bar wall side.**

D. Baby changing stations: Install on walls where indicated in accord with manufacturer's installation instructions at height required to meet ADA requirements.

E. Conceal evidence of drilling, cutting, and fitting adjacent finishes.

### 3.03 ADJUST AND CLEAN

A. Adjust accessories operating parts for correct operation.

B. Clean and polish exposed surfaces not more than 48 hours prior to Date of Substantial Completion.

C. Deliver accessory schedule, keys, and parts manual as part of Project Close-out documents.

## **SECTION 10990 MISCELLANEOUS BUILDING SPECIALTIES**

### **PART 1 - GENERAL**

#### 1.01 SUBMITTALS

A. Product data:

1. Indicate material types, finishes and sizes, fabrication and installation details, and requirements.
2. *"Manufacturer's Safety Data Sheets"*, (M.S.D.S.), for materials.

B. Shop drawings: Indicate locations, installation details, special requirements necessary for coordination.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURED UNITS

A. Safe deposit boxes:

1. Acceptable manufacturers:
  - a. Creative Industries, Inc.
  - b. Diebold, Inc.
  - c. Inter Innovation LeFebure.
  - d. Mosler, Inc.
  - e. Overly Manufacturing Company.
2. Characteristics:
  - a. Product standard of quality: Mosler, Inc.; SD Series.
  - b. Section size: 11" by 22" by 24" deep, approximately.
  - c. Number of boxes per section: Seven or 14.
  - d. Quantity required: One for each room plus four; four seven box sections; and four 14 box sections.
  - e. Provide required accessories for installation and operation.

### **PART 3 - EXECUTION**

#### 3.01 GENERAL

A. Install specialties in accord with manufacturer's product data, plumb, level, and true to line and location.

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3.02 INSTALLATION

- A. Safe deposit boxes: Install where indicated in accord with manufacturer's installation instructions and reviewed shop drawings.

**SECTION 10900. IRRIGATION BID**

- A. Provide Owner with an alternate bid for site irrigation.

**DIVISION 11 EQUIPMENT****SECTION 11451 RESIDENTIAL APPLIANCES****PART 1 - GENERAL****1.01 WARRANTY**

A. Furnish manufacturer's standard appliance warranty as part of Project Closeout documents.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

A. Acceptable manufacturers:

1. Products specified as standard of quality are indicated in MANUFACTURED UNITS Article.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to prior approval of proposed product list.
  - a. Acme National Sales Company, Inc.
  - b. Builders Choice.
  - c. Frigidaire Company.
  - d. General Electric Company, Major Appliances Division; indicated as "GE".
  - e. Hotpoint Distribution Sales Operation, General Electric Company; indicated as "Hotpoint".
  - f. Whirlpool Corp.

**2.02 MANUFACTURED UNITS**

A. Countertop placed microwave oven:

1. Acceptable product: GE Model JET344J.
2. Characteristics: Countertop oven with electronic touch controls, clock timer, ten power levels, 1.4 CF capacity; 800 watts output, 120 VAC, 13.3 amps.

B. Ice maker:

1. Acceptable product: Acme National Sales Company, Inc.; Model ACM50.
2. Characteristics: 18" wide by 24" deep, 50 lb. capacity undercounter icemaker; 115 VAC, 250 watts; 1/4" dia. O.D. water supply.

**PART 3 - EXECUTION****3.01 PREPARATION**

A. Protection: Protect prefinished surfaces from damage or staining. Provide protective covering for equipment following installation until Date of Substantial Completion.

**3.02 INSTALLATION**

A. General:

1. Uncrate and set appliances in place or install in cabinets as indicated; remove tape and packing materials. Level units, clean finishes, plug-in or make connections to junction box as applicable; test all functions to assure proper operation.

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2. **Icemakers:** Set power switch to off; connect icemaker to valve box on wall adjacent refrigerator.
  3. **Other equipment:** Perform final electrical, mechanical, and plumbing connections as required.
- B. Test appliances for correct operation; maintain power to icemakers; leave other appliances plugged into outlets.

**DIVISION 12 FURNISHINGS****SECTION 12484 FLOOR MATS AND FRAMES****PART 1 - GENERAL****1.01 SEQUENCING AND SCHEDULING**

- A. Furnish frame at appropriate time for incorporation into construction activities performed in other sections.

**PART 2 - PRODUCTS****2.01 MANUFACTURERS**

- A. Acceptable manufacturers:
1. Owner to provide floor mats.
  2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to approval of product list and samples.
  3. Surface mats:
    - a. Balco, Inc.
    - b. Construction Specialties, Inc.
    - c. J.L. Industries.
    - d. R.C. Musson Rubber Company.
    - e. Reese Enterprises, Inc.

**2.02 MANUFACTURED UNITS**

- A. Surface mats:
1. Product standard of quality: R.C. Musson Rubber Company; Aluminum/Vinyl Roll-Up Floor Mats.
  2. Inserts: Carpet.
  3. Frame: Extruded vinyl frame; medium bronze finish.
  4. Size: Indicated.
  5. Colors: A535 Buckskin.

**PART 3 - EXECUTION****3.01 INSTALLATION**

- A. Surface entrance mats: Set mat including vinyl frame in place not more than 48 hours prior to Date of Substantial Completion.



## **DIVISION 13 SPECIAL CONSTRUCTION**

### **SWIMMING POOL PERFORMANCE GUIDELINES**

#### **I. SCOPE**

- A. Applicable requirements for Conditions of Contract and of Sections listed under General Requirements apply to work specified in this section
- B. Work Included:
  - 1. Scope
  - 2. General
  - 3. Structure and Size
  - 4. Quality Assurance
  - 5. Submittals
  - 6. Products
  - 7. Painting
  - 8. Start up, Instructions and Record Drawings
  - 9. Warranty
- C. Work of Other Sections:
  - 1. Necessary drains, hose bibs, drinking fountains and gas lines. See Plumbing DIVISION 15P.
  - 2. Electrical hook-ups. See Electrical DIVISION 16.
  - 3. Concrete deck. See DIVISION 3.

#### **II. GENERAL**

- A. This section of the work shall apply to indoor swimming pool applications requiring all labor, materials, and equipment. The Contractor shall perform all operations in connection with providing a complete system of fully compatible components and construction methods including but not limited to the following: pool structure, pool and non-slip deck finish, drainage system (deck, equipment discharge, sanitary sewer), recirculation and filtration system, chemical treatment devices, heating equipment (pool, space) and venting system, plumbing provisions, electrical system, fixtures and deck equipment required according to codes and best established practices whether specified or not, for a complete and operable pool entity.
- B. This Contractor shall excavate for this work. Excavation shall be in accordance with applicable portions of Section 02200., Part 3. Coordinate pool work with other building trades.
- C. The Contractor or Sub-contractor(s) are responsible for permits: State, Local. Construction, Electrical, Plumbing, etc.

#### **III. STRUCTURE AND SIZE**

- A. Pool to be concrete reinforced tank with 6" tile border and Gunitite walls with integral coping caulked with marbre plaster interior. **Vinyl and fiberglass are not allowed.**

Swimming Pool Specification  
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- B. Swimming pool size/configuration shall be per architect's plans.
- C. Pool depth to be a minimum of 3'-0" (shallow end) and 5'-0" (deep end).
- D. Depth markings must be clearly visible on the inside rim of the pool and on the pool coping. No diving boards, platforms, slides or trampolines.
- E. The pool coping shall be submitted to owner and architect for approval.

IV. QUALITY ASSURANCE

- A. Pool work specified shall be accomplished by a single Contractor who regularly performs construction, installation and servicing of swimming pools and equipment.

V. SUBMITTALS

- A. Provide complete shop drawings of the pool with all equipment involved. Provide details and material information.
- B. Submit manufacturer's catalogue information where applicable. Provide certificates indicating that pool, as designed and specified, conform to requirements of governing authorities.
- C. Contractor to submit pool area drawing showing dimensions, finish elevations for perimeter (deck or formed curbing), deck drains, pool coping, and at building line.

VI. PRODUCTS

A. Gunite Work:

- 1. Cement shall conform to requirements of ASTM G-150, Type 1. Gunite sand shall consist of clean, hard, sharp particle; mixture contents shall not exceed 5%, and sand shall be well graded in size within the following limits:

|                                    | <u>Percent by Weight</u> |
|------------------------------------|--------------------------|
| Passing through 3/8 inch screen    | 100                      |
| Passing through No. 8 mesh sieve   | 70 to 95                 |
| Passing through No. 16 mesh sieve  | 60 to 85                 |
| Passing through No. 30 mesh sieve  | 45 to 65                 |
| Passing through No. 50 mesh sieve  | 15 to 35                 |
| Passing through No. 100 mesh sieve | 0 to 5                   |

- 2. Portion shall be one (1) part cement of 3-1/2 parts Gunite sand by volume; mixed dry in a batch mixing machine for a period of not less than one (1) minute after materials have been added.
- 3. Hydration shall occur at the nozzle of the cement gun; using just enough water so that no slump shall occur in Gunite.

4. Cement gun shall be equipped with an air pressure gauge, and air pressure at the gun shall not be less than 45 psi nor more than 70 psi when material hose is 200 feet in length, or less. Air pressure shall be increased 5 psi for each additional 50 feet of material hose used, but not more than 300 feet of material hose shall be used unless approved by the Owner's Representative. Water pressure at gun nozzle shall be maintained at not less than 15 psi greater than air pressure at the gun.
5. Structural Gunitite shall be applied against original undisturbed soil, thoroughly compacted earth, or existing concrete that will not yield during Gunitite application.
6. Where Gunitite is applied against concrete, concrete surface shall be thoroughly cleaned and drenched with water at least twice on the day before placing Gunitite. Surfaces upon which Gunitite is to be applied shall be sufficiently damp to prevent excessive absorption of water content in Gunitite mix, but not so wet as to overcome suction.
7. Gunitite deposited on vertical surfaces shall be shot at right angle to surface starting at the bottom and continuing upward. It shall be built up in layers of a thickness that will not slump, allowing sufficient time between placing of layers for initial set to take place.
8. All loose, fine aggregate or rebound shall be removed from surface being Gunitited before placing succeeding layers, and whenever possible the first layer shall entirely cover reinforcing steel in order to secure it in proper position.
9. Gunitite concrete shall attain a minimum compressive strength of 6,000 psi at 28 days.
10. Structural Gunitite shall be continuously moist cured for no less than seven (7) days.
11. Sealant joints shall be installed with compatible compressible filler material using silicone, one part polyurethane or two parts polysulphide. Joints shall be cleaned and primed.

**B. Steel Reinforcement:**

1. Reinforcing steel shall be standard sizes of deformed bars equal to requirements for "Standard Specifications for Billet Steel, Concrete Reinforcement", intermediate grade, serial designation 15 as adopted by the American Society for Testing Materials, or rail steel reinforcing bars, equal to the requirement of Serial Designation GR40 as adopted by the ASTM.
2. Reinforcing steel shall be in place before concrete placing is commenced; shall be new, free from dirt, oil, paint, and mill scale, shall be positioned, and of the size indicated.

3. Wall and slab steel shall be securely wired together at points where bars come across to insure maintaining their position. Spices shall be staggered, and laps shall not be less than 40 diameters.

C. Interior Pool Finish:

1. Interior surfaces of pool structure shall be coated with a marbleized plaster finish consisting of two parts "Marbelite" to one part white cement (waterproof).
2. Plaster shall be applied in two coats with a total thickness of not less than 1/4" or more than 1/2".
3. No plaster shall be applied during adverse weather conditions or at temperatures below 60° F.
4. Prior to commencement of plastering work, pool walls shall be thoroughly washed down with a diluted solution of muriatic acid and flushed down with fresh water to assure a clean surface free of loose materials, dust, and foreign matter.

D. Filter System General:

1. Furnish equipment for recirculating, clarification and chemical treatment of water in two separate pool systems described as required for main pool.
2. Components necessary for proper operation of the recirculating and treatment system shall be furnished by a single supplier. Supplier shall guarantee that equipment furnished is correct capacity, and various components are designed to operate properly in conjunction with each other.
3. Three (3) sets of detailed operating instructions in laminated plastic covered booklet form shall be delivered to Architect at start-up.

E. Filter Media:

1. Each filter cell shall be provided with the proper depth of filter sand.
2. Filter sand shall be practically pure silica, free from appreciable quantities of foreign material, and particles shall be round or angular and not flat or elongated.
3. Sand shall have an effective size of .45 to .55 mm with uniformity coefficient of 1.6 maximum.

**F. Filter Exterior Piping:**

1. Provide all necessary piping valves, pressure gauges, and equipment as required for complete code approved pool.
2. Gauges shall be mounted readily visible for easy reading. The filter shall also be equipped with a backwash site glass.
3. Backwash discharge into storm system, or surface, or into a sanitary system as per code.
4. Approval and performance standards: The filter system shall be listed and approved by the National Sanitation Foundation for sand filters at flow rates from 15 to 20 GPM per square foot of filter area, and bear the National Sanitation Foundation Seal of Approval.
5. Provide condensate or relief drain piping from pool filters to floor drain. (For enclosed pool)

**G. Chlorinators:**

1. Provide and install positive displacement, electric driven, diaphragm type solution feeders of adequate size.
2. Complete with solution tanks, recirculating pumps and motors. (Provide Bromine as alternate.)

**H. Pool Equipment and Other Fittings:**

1. Hydrostatic Relief Assembly: Provide and install in pool main drain sump a 2" cyclac plastic spring loaded valve with collection tube.
2. Skimmers: Provide and install, per approved plans, where shown, cyclac plastic floating weir automatic surface skimmers with lid, lid ring, and basket. Skimmer to internal trimmer valves to adjust flow rate to shut off.
3. Inlets: Pool to be equipped with 1-1/2" cyclac fittings adjustable in flow rate to shut off and direction per Ch. H 71.12 (9) (a) (b).
4. Pool to have one row of 6" x 6" tile at water line as shown on drawings. Tile color as selected by Owner.

5. Underwater Lights: Provide a minimum of two (2) low voltage wet niche pool lights, 110V/400W, where shown on the drawings for the pool. Stainless steel light niche to have 1" conduit connection, internal ground clamp, and external bounding clamps. Light fixture to have cord of required length to reach junction boxes where shown on the drawings. Niche and fixture to be UL listed for swimming pool application.
6. Furnish and install main drain frames and grates in pool as required.

I. Miscellaneous Equipment:

1. Deck and Miscellaneous Equipment. The Pool Contractor shall furnish, where applicable, the following equipment: Ladders, handrails, fill spout, deck anchors and escutcheons.
2. Maintenance Equipment: Vacuum cleaner, hose, hose adapter, leaf skimmers, pool brush, handles, test set, first aid kit, stretcher, shepherds crook, ring buoy and two (2) durable blankets.
3. All pool heaters to be seal-combustion units.
4. Pool Contractor to coordinate any exhaust or combustion air louvers or fans with General Contractor.

J. Pool Piping:

1. Furnish and install returns, skimmers, drains and any other related fittings in pool.
2. Furnish and install all pipe, valves and fittings between filter unit and pool.
3. Furnish and install connections from filter unit to site drain in equipment room for the purpose of backwashing sand filters.
4. Deck Drains: To be in-line type. Discharge into storm system, or surface, or into a sanitary system as per code
5. NOTE: Any item of equipment or materials obviously a part of the filter and pool recirculation system and necessary to its operation, but not specifically mentioned in the specifications or shown on the drawings, shall be furnished by this Contractor as a part of this work at no extra cost.

5. **Workmanship:** All materials to be used in this work shall be installed by workmen thoroughly skilled in their trade and all work shall present a neat and mechanical appearance when complete.

**K. General:**

1. The drawings indicate the general arrangement of pool plumbing. Details of proposed departures due to actual field conditions or other causes shall be submitted to the Architect for approval. The Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment as indicated without substantial alterations.
2. No installation shall be made that will provide a cross section of inter-connection between distributing supply for drinking purposes and the swimming pool that will permit a backflow of water into the pool water system. Pipe openings shall be closed with caps or plugs during installation. Equipment and pool fittings shall be tightly covered against dirt, water and chemical or mechanical injury. At the completion of the work the fittings, materials and equipment shall be thoroughly clean and adjusted for proper operation.

**L. Testing:**

1. **Pressure Piping:** After the pipe is laid, the joints completed, and the trench partially backfilled leaving joints exposed for examination, the newly laid line shall be subject to a hydrostatic pressure of not less than 50 pounds per square inch gauge and proved tight at this pressure for a period of two (2) hours.
2. **Gravity Lines:** A water test shall be applied to all gravity drain piping systems, either in their entirety or in sections. All openings shall be tightly plugged and each system filled with water and tested with at least a ten (10) foot head of water. The water shall be kept in the system or in the portion under test, for at least fifteen (15) minutes before the inspection starts; the system shall then be proved tight at all joints.
3. **Flushings:** All pipelines leading to the pool shall be thoroughly flushed clean with chlorinated water before the pool is filled and placed in use.

**VII. PAINTING:**

- A. Provide ceramic pool water depth indicator numbers in feet and meters in 4" high letters on pool deck edge and on face of pool walls per state code.

**VIII. START-UP, INSTRUCTIONS AND RECORD DRAWINGS:**

- A. **Vacuum Diatomaceous Earth Filter:** Qualified representative of SPC of manufacturer shall visit the site of work after installation of such equipment has been completed, shall put into operation all mechanical equipment, and shall assist and instruct Owner's Representative in operation of such equipment. See Section 01700.

- B. Water Treatment Control System: Check out final installations, start-up of system, calibration of instrument and instruction of operating personnel shall be performed by an authorized representative of manufacturer. Provide all chemicals required to start-up and operate system.
- C. Pool Equipment: In addition to furnishing the Owner with two (2) copies of operating manuals and parts listed for the swimming pool equipment, the SPC shall have a qualified representative at the site to instruct the Owner's personnel on the proper operation and maintenance of the pool equipment prior to the pool being turned over to the Owner. In addition, SPC shall provide four (4) working days spread over a period of one (1) month to Owner for instructions and checking of the system.
- D. Cooperate and coordinate work of all trades.
- E. Furnish two (2) sets "record" drawings for pool and filter system including piping. Furnish two (2) sets to Architect.
- F. Provide service maintenance proposal for Owner.

IX. WARRANTY:

- A. SPC shall submit in writing a warranty for five (5) years, full and complete repair of pool structure covering any defects, cracks and/or leaking in pool shell and circulation system caused by defective workmanship and/or materials, provided that the pool is kept full of water at all times except for cleaning. Cleaning of pool shall be conducted to low or normal ground conditions at site.

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Revised 10/24/03



## **DIVISION 14 PASSENGER ELEVATOR**

### **SECTION 14212. HYDRAULIC PASSENGER ELEVATOR**

#### **1.0 GENERAL**

#### **1.1 RELATED DOCUMENTS**

The General Conditions, Supplementary Conditions and applicable provisions of Division 1 are hereby made a part of this Section as fully as if repeated herein.

#### **1.2 DESCRIPTION OF WORK**

Work included in this Section includes all labor, material and equipment required to install complete one hydraulic passenger elevator with attendant pumps, jacks, cabs and controls and permits.

#### **1.3 ELEVATOR CRITERIA**

|                             |                                |
|-----------------------------|--------------------------------|
| Capacity (Each Elevator)    | 2500 pounds                    |
| Speed                       | 150 ft/min                     |
| Car (Inside Clean)          | 6'-8" x 4'-3" x 8'-0" high     |
| Entrance                    | One Way Slide                  |
| Doors                       | Enameled Steel                 |
|                             | 3'-6" x 7'-0" clear            |
| Controls                    | Selective Collection           |
| Flooring                    | Carpet - by Owner              |
| Ceiling                     | Lighted Open Lay-in            |
| Power Units (Each Elevator) | 30 HP AC, 208V, 3 phase 60 Hz. |
| Travel Distance             | (verify w/job conditions)      |
| Landings Served             | 1,2,3, 4, 5                    |
| Emergency Lighting          |                                |
| Railings                    | 3 sides                        |

#### **1.4 QUALITY ASSURANCE**

Elevators shall be installed by the elevator company or their licensed representative who has had not less than five years successful experience in installing this type of elevator.

#### **1.5 REGULATORY REQUIREMENTS**

- A. **Elevator Code:** ANSI A17.1 "American Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Sidewalks."
- B. **NFPA:** Comply with applicable NFPA codes, and specifically with Sections relating to electrical work and elevators.
- C. **Fire Resistance of Entrances:** Comply with NFPA No. 80 and provide units with UL labels with 90 minutes temperature rise on the labels.

- D. **NE II Standards for Disabled:** Unless otherwise indicated, comply with the American Disabilities Act.

## 1.6 SUBMITTALS

- A. Submit manufacturers detailed technical data and installation instructions.
- B. **Shop Drawings:** Submit plans, elevations and details of car enclosures and hoistway entrances. Prepare elevating diagrams to show service to each level. Show excavation requirements for jack.
- C. **Samples:** Submit sample of exposed finishes of car enclosures and hoistway entrances, and signal equipment; 8" squares of materials and 12" lengths of running trim members.
- D. **Maintenance Manuals and Electrical Equipment Plans:** Submit bound manual for each elevator or group of elevators, with operating and maintenance instructions, parts listings, recommended parts inventory listings, purchase source listings, for major and critical components, emergency instructions and similar information.
- E. **Certificate and Permits:** Provide Owner with copies of all inspection/acceptance certificates and operating permits as required by governing authorities to allow normal, unrestricted use of elevators.

## 1.7 INITIAL MAINTENANCE AND WARRANTY

- A. **Maintenance:** For a period of 3 months following date of substantial completion, provide full maintenance of elevator work on a daily-surveillance basis. Correct operational faults and restore/replace defective/deteriorated components and finishes. Lubricate operational units and supply expendable materials as required for proper operations and maintenance.
- B. **Warranty:** Provide special project warranty, signed by Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of elevator work during warranty period. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
1. The warranty period is 12 months starting on date of substantial completion of elevator work.

## 2.0 PRODUCTS

### 2.1 MANUFACTURERS

- A. The design is based on ThyssenKrupp Corp. "Marquis 25" with cab style DLP. The following manufacturers are acceptable:
1. ThyssenKrupp Elevator Co.
  2. Otis Elevator Co.
  3. Schindler Haughton Elevator Co.

## 2.2 MATERIALS AND COMPONENTS

- A. General Requirements:** Provide manufacturer's standard pre-engineered elevator systems, which will comply with or fulfill the requirements of elevator schedule sheets at end of this section; or, at manufacturer's option, provide custom manufactured elevator systems which will fulfill requirements. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems, and as required for a complete system.

All shunt devices, emergency return to first floor features, or electrical and safety devices, etc. required for the elevator by local codes shall be part of the elevator contractor's responsibility.

## 2.3 HYDRAULIC MACHINES AND ELEVATOR EQUIPMENT

- A. General:** Except as otherwise indicated, provide manufacturer's standard single, single-acting under-the-car hydraulic plunger-cylinder unit for each elevator, with electric pump-tank-control system equipment in machine room as shown.
- B. Piping:** Provide size, type and weight and piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions from power unit.
- C. Inserts:** Furnish required concrete inserts and similar anchorage devices for the installation of guide rails, machinery and other components of elevator work; where installation of devices is indicated as work of another specification section.
- D. Car Frame and Platform:** Manufacturer's standard welded steel units; except provide special heavy-duty units where indicated for power truck loading (freight elevators), designed to withstand impacts and wheel loading indicated.

## 2.4 SIGNAL EQUIPMENT

- A. General:** Except as otherwise indicated, provide manufacturer's standard signal equipment for each elevator. Provide car control equipment for each elevator. Provide car control station and car position indicator in each car, hall push-button station on each landing for each group of elevators.

Per the new ADA legislation the elevator call buttons should be center at 42" above finish floor, contain registered light, be 3/4" in diameter.

Hall Lanterns must sound once for up and twice for down, be at least 72" above floor, be 2 1/2" in the smallest dimension.

Provide raised Braille floor designation on both entry jambs, 60" above floor, 2 1/2" high raised 1/32", and be accompanied by Grade 2 Braille.

The reopening device of the elevator cab doors must remain effective for at least 20 seconds. Doors must remain open for 3 seconds when answering calls.

- B. Provide illuminated buttons and signals, which light up when activated and remain lighted until call or other function has been fulfilled; fabricate of acrylic or other permanent translucent plastic.**

Except for buttons and illuminated signal elements, fabricated signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional polish or satin finish.

- C. **Car Control Stations:** Provide flush-mounted metal panels, containing call button for each landing served, and containing other buttons, switches and controls required for specific car operation and control. Mount as shown, or scheduled, and at height complying with ADA.
- D. **Car Position Indicator:** For passenger or cars, provide either illuminated signal type or digital-display type, located near top of car. Include direction-of-next-travel signal if not provided in car control station.
- E. **Hall Push-Button Station:** For each group of passenger elevators, locate between two elevators at center of group, or at location most convenient for approaching passengers. Provide type with flat face plate for surface mounting on wall finish (body of unit recessed). Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available, and indicate which direction that is.
- F. **Car Riding Lanterns:** Provide units with illuminated "up" and "down" signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from jamb frame for ease of angular viewing. Match materials, finishes and mounting method with hall push-button stations.
- G. **Telephone:** Provide rough-in for telephone hand set in each car, contained in flush-mounted cabinet and complete with identification and instructions for use. Inform contractor and Owner if specific tie-in is required (by local authority and state authority) back to front desk, monitoring service, or to Fire Department.
- H. **Alarm System:** Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to "Alarm" button at each car control station.

## 2.5 PASSENGER ELEVATOR CAR ENCLOSURE

- A. **General:** Provide manufacturer's standard pre-engineered car enclosures, of the selections indicated (Dover "DLP"). Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, accessories, key access as required by local code, return to first floor feature and floor finish unless indicated as not work of this section. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.

Cab size shall be 51" x 68" minimum with cab control between 35" to 54" from floor. All applicable aspects of the ADA must be adhered to.

- B. **Materials and Fabrication:** Provide selection as indicated for each car enclosure surface; manufacturer's standards, but not less than the following:
  1. **Enamel Steel Panels:** ASTM A 366, stretcher leveled, brushed finish with manufacturer's standard baked synthetic enamel finish, custom color P-1 indicated on Finish Schedule. (Verify with Owner).
  2. **Stainless Steel Door Interior Finish:** AISI Type 302/304; with manufacturer's standard directional brushed finish.

3. Lobby to have stainless steel, gauge required; No. 4 brushed finish.
4. Swing front returns and entrance columns and doors, gauge required: Stainless steel, No. 4 brushed finish.
5. Aluminum Sills: Cast or extruded aluminum, with grooved surface 1/4" thickness, mill finish.
6. Plastic Laminate: High-pressure type complying with NEMA LD3, 0.05" thickness; over wood core on three walls. Color: Nevamar; Crown Mirror, WB-294M.
7. Fabricate car doorframe integrally with front wall of car.
8. Fabricate car with recesses and cutouts for signal equipment.
9. Luminous Ceiling: Downlight six pin light stainless steel ceiling with enamel surrounds for each pin light; include bulbs. Finish to match entrance columns.
10. Carpet: Not a part of this contract.
11. Handrails: Provide manufacturer's stainless steel No. 4 brushed finish handrails, on side walls and back wall; either continuous or panelized.
10. Door Edge Protective Device: Provide retractable edge shoe on leading edges of elevator entrance doors which, upon contacting an obstruction in entrance, causes doors to stop and reopen.
11. Fabricate car with recesses and cutouts for signal equipment.
12. Walls: 14 gauge minimum, reinforced at 16" maximum spacing.
13. Ceilings: 20 gauge minimum, reinforced at 16" maximum spacing.
15. Stainless steel pad hooks with quilted protection pads on each wall.

## 2.6 PASSENGER HOISTWAY ENTRANCES

- A. General: Except as otherwise indicated, provide manufacturer's standard, pre-engineered, hollow metal type, sliding, door-and-frame hoistway entrances; complete with track systems, hardware, safeties, sills and accessories. Match car enclosure doors for size, number of door panels and door panel movement. Provide frame-section size and profile to coordinate with hoistway wall construction as indicated.
- B. Materials and Fabrication: Provide selections indicated; manufacturer's standards, but not less than the following:
  1. Enameled Frames: Formed steel; with manufacturer's electrostatically painted synthetic enamel finish, colors as selected by Owner. Contractor to furnish Owner with color selection charts.
  2. Enameled Door Panels: Flush cold-rolled steel construction, ASTM A 266, stretcher leveled, matte finished; with manufacturer's electrostatically painted synthetic enamel finish, colors as selected by Owner upon being furnished manufacturer's color selection charts by Contractor.
  3. Aluminum Sills: Cast or extruded aluminum, with ground surface, 1/4" thickness, mill finish.

## 3.0 EXECUTION

### 3.1 INSPECTION

- A. Prior to commencing elevator installation, installer shall inspect hoistways, hoistway openings, pits and machine rooms, as constructed, shall verify all critical dimensions, and examine supporting structure and all other conditions under which elevator work is to be installed. Notify Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

### 3.2 INSTALLATION OF ELEVATOR SYSTEM

- A. General: Comply with manufacturer's instructions and recommendations for work required during installation.
- B. Excavation for Jack: Drill excavation in each elevator pit to accommodate installation of plunger-cylinder unit.
- C. Install casings with waterproof seals at pit floor, and with waterproof, high-pressure seal at bottom of casings.
- D. Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place. Protect and coat cylinder piping and steel end cap with cathodic coating. Backfill around cylinder with sand.
- E. Welded Construction: Provided welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- F. Coordination: Coordinate elevator work with work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines and levels designated by contractor, to ensure dimensional coordination of the work.
- G. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure, and thereby eliminate sources of structure-borne noise from elevator system.
- H. Install piping without routine underground, where possible; where not possible, cover underground piping with permanent protective wrapping before backfilling.
- I. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
- J. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails, for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- K. Leveling Tolerance: 1/2", up or down, regardless of load and direction of travel.

- L. Grout sills with non-staining, non-shrink grout. Set units accurately aligned with and slightly above finished floor at landings.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptable Testing: Upon nominal completion of each elevator installation, and before permitting use of elevator (either temporary or permanent), perform acceptable tests as required and recommended by Code and by governing regulations or agencies.
- B. Advise Contractor, Owner, Architect and Inspection Department of governing agencies in advance of dates and times tests are to be performed on elevators.

### 3.4 PROTECTION

- A. At time of substantial completion of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs or such other methods of procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.
- B. Provide similar protective measures for elevator units that will be placed in temporary service, including inspection and maintenance service during period of temporary service.

### 3.5 INSTRUCTION AND MAINTENANCE

- A. Instruct Owner's personnel in proper use, operations and daily maintenance of elevators. Review emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operation failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation, with Owner's personnel present and just prior to date of substantial completion. Determine that control systems and operating devices are functioning properly.
- C. Continuing Maintenance: Installer shall provide a continuing maintenance proposal to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date construction contract maintenance requirements are concluded. State services, obligations, conditions and terms for agreement period, and for renewal options.

Note: See DIVISION 10 SPECIALTIES, Section 10260. for elevator door frame protection

HAMPTON INN  
FLOWOOD, MISSISSIPPI  
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## SECTION 15010 - GENERAL CONDITIONS FOR MECHANICAL WORK

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.
  - 1. Examine such documents together with addenda issued and bid the work in accordance with same.
  - 2. Certain paragraphs included in this section are supplementary to similar paragraphs in above named documents. They are not intended to supersede those paragraphs. Should any conflict exist, the matter shall be referred to the architect for clarification.

#### 1.02 SPECIAL CONDITIONS

- A. These special conditions shall supplement the conditions of the contract.
- B. Codes, ordinances, rules and regulations:
  - 1. Plumbing: Perform all work under this contract in strict accordance with the plumbing code of the municipality, city, county, parish, state or other authority having jurisdiction, the International Plumbing Code all other pertinent codes and ordinances, and per NEC, AGA and NMPC requirements, where applicable.
  - 2. H.V.A.C.: Perform all work in accordance with the mechanical code of the municipality, city, county, parish, state or other authority having jurisdiction, the International Mechanical Code and all other codes, ordinances, rules and regulations in effect at the site.
  - 3. All work done under this contract shall comply with all state and local codes having jurisdiction and with the requirements of the utility companies whose services may be used. All modifications required by these codes shall be made by the contractor without additional charges. Any conflict between these documents and the governing codes shall be immediately brought to the attention of the engineer of record. Where code requirements are less than those shown on the plans or in the specifications, the plans and specifications shall be followed. Where applicable, N.F.P.A. requirements shall be met.

4. The contractor shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).
5. The publications listed below form a part of this specification to the extent referenced and are referred to in the text by the basic designation only:

Air-Conditioning and Refrigeration Institute Standards (ARI)

American National Standards Institute, Inc. Standards (ASNI)

American Society for Testing and Materials Publications (ASTM)

American Gas Association Inc. Laboratories (AGA)

American Society of Mechanical Engineers Code (ASME)

National Fire Protection Association Standard (1986) (NFPA)

Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA)

Underwriters Laboratories, Inc. (UL)

International Plumbing Code

International Mechanical Code

ASME - Boiler Pressure Vessel Code (All revisions and sections)

NEBB - National Environmental Balancing Bureau

#### 1.03 WORK BY OTHERS

- A. The general contractor will include in his work the leaving of openings in the building roof, floors and walls for supply, return and exhaust air ducts and piping otherwise noted or specified herein. It is this contractor's responsibility to see that all openings are left in floors and partitions for the proper operation of the system and that all openings are in the correct location and are dimensioned to receive the specified piping, duct or equipment.
- B. All power wiring and final power connections to the system shall be provided under Division 16. Motor controls, pilot lights, push buttons, and equipment starters shall be provided under Division 15 either separately or as part of the packaged system.

- C. Concrete for equipment foundations, housekeeping pads, inertia bases, pipe supports, etc. shall be by the general contractor. This contractor shall provide dimensioned drawings and anchor bolts for general contractors use.

#### 1.04 FEES, PERMITS AND INSPECTIONS

- A. Secure all permits, licenses and inspections as required by all authorities having jurisdiction. Comply with all laws, ordinances, rules, regulations and contract requirements bearing on the work; notify proper authorities as required to permit timely inspection of the work. Keep all inspection tags of approval or disapproval and provide proof of inspection and approval by authorities having jurisdiction, if requested by architect.
- B. Pay all fees required.

#### 1.05 SOIL CONDITIONS

- A. This specification and the drawings in no way imply the condition of the soil to be encountered. Where excavating is required, each contractor agrees that he has informed himself regarding conditions affecting his work, labor, and materials required without recourse to any representation as to soil conditions that may appear or seem to be implied in any portion of the contract documents.

#### 1.06 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, drawings are essentially diagrammatic and, although size and location of equipment are to be drawn to scale whenever possible, the contractor shall make use of all data in all of the contract documents and shall verify this information at building site.
- B. The drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets, and it shall be the work of this section to install piping in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the owner.
- C. It is intended that all apparatus be located symmetrically with architectural elements, and shall be installed at exact height and locations as shown on the architectural drawings. Any equipment or piping installed in locations different than shown or requiring physical space other than shown or specified shall be done at responsibility of the contractor and shall be subject to approval of the architect.

- D. The contractor shall fully inform himself regarding any and all peculiarities and limitations of spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The contractor shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the architect any discrepancies or interference's that are discovered. Failure to report such discrepancies and interference's shall result in the correcting of these errors or omissions by the contractor at his own expense. All work installed under this division which deviates from the drawings and specifications without prior approval of the architect, shall be altered by the contractor at his own expense to comply with the drawings and specifications as directed.
- E. The contractor shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered. In all cases, lines requiring a stated grade or slope for their proper operation shall have precedence. Any piping, ductwork, or equipment which interferes with the proper routing of lines requiring a stated grade or slope, shall be removed and re-routed as necessary to avoid conflict.
- F. It is the intention of the drawings that the plumbing contractor be responsible for the final connection of all sanitary sewer, domestic water, and other services to the building.

#### 1.07 INSPECTION OF SITE

- A. Prior to submitting a bid or commencing work, the contractor shall visit the construction site and shall thoroughly acquaint himself with existing conditions and shall include in his bid the cost of any existing conditions which may affect his work.
- B. Every effort shall be made by the contractor to protect existing utilities. Any damage to the existing utilities shall be repaired at the contractor's expense.
- C. This contractor shall be aware of the fact that utility systems existing must be maintained in continuous operation during all phases of the work required by these specifications. This contractor shall carefully schedule his work with the owner's operations and needs of other contract divisions and shall make such temporary connections necessary for unimpaired operations.

#### 1.08 WORKMANSHIP, MATERIALS AND EQUIPMENT

- A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the plans.

#### 1.09 CUTTING AND PATCHING

- A. This contractor shall perform all cutting required for the introduction and placement of this work. The general contractor shall perform all patching work. Cutting and patching required as a result of the omission of an opening in construction shall be done by the contractor at his own expense.
- B. All patching shall be done by the general contractor. This contractor shall coordinate patching with general contractor to insure finished condition matches adjacent area.

#### 1.10 PROTECTION OF WORK

- A. This contractor shall protect his work at all times from damage by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The contractor shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.
- B. This contractor shall receive, unload and protect all equipment to be provided under this division by the contractor. Additionally, the contractor shall receive, unload and protect all equipment to be provided by others but connected by this contractor.

#### 1.11 NOISE LEVEL

- A. The equipment selected and specified is done so in order to establish design NC levels. Any equipment provided other than specified shall not exceed the design NC levels.

#### 1.12 CERTIFICATION

- A. Prior to completion and final acceptance of the mechanical systems, furnish to the architect certification that all mechanical systems have been tested and that the installation and performance of these systems conform to the requirements of the plans and specifications.

### PART 2 - PRODUCTS

#### 2.01 PRODUCTS AND MATERIALS:

- A. The equipment to be furnished under this contract shall be the standard product of the manufacturer. Where two or more units of the same equipment are required, they shall be products of a single manufacturer.
- B. All materials shall be new and of the best quality.

## 2.02 MANUFACTURER'S QUALIFICATIONS

- A. Manufacturer's names are mentioned in these specifications to establish a standard of quality and construction, and except where a choice among several listed manufacturers is given, it is not intended to exclude the product of any reputable manufacturer regularly engaged in the commercial production of specific equipment, provided all essential requirements of the specifications relative to material, capacity and performance and appearance are met and are approved by engineer and architect.

## 2.03 SUBSTITUTION OF MATERIALS AND EQUIPMENT

- A. For products specified herein, bids shall be based on products named in project manual and on plans, or on items designated as an "approved equal". A product not named in project manual or on plans will only be acceptable when such product meets all other requirements of project specifications, including specifications of originally specified products' manufacturer as of date of contract documents and request has been made for product substitution.

The first manufacturer listed in these specifications and the manufacturer and catalog number listed in the equipment schedules was used for design, layout, performance, physical size, space and structural requirements, electrical requirements and general appearance. Any equipment selected from the approved alternate list of manufacturers must be compatible with the facility and meet all requirements of the contract documents. Any changes required due to the alternate selected equipment being different from the design basis equipment, shall be the responsibility of the mechanical contractor and he shall pay for any increased costs as a result of these changes.

- B. Requests for approval of a product as equal will not be considered unless sufficient data for evaluation is received seven (7) days prior to the bid opening date.

## PART 3 - EXECUTION

### 3.01 MEASUREMENTS



- A. All contractors shall verify measurements and shall be held responsible for the correctness of same. No extra charges or compensation will be allowed for differences between actual dimensions and those indicated by the plans. Any differences found shall be submitted to the architect for consideration before proceeding with the work.
- B. Where equipment is being furnished by another contractor or the owner and connected by this contractor, this contractor shall request of the architect an approved drawing showing exact dimension of required locations of services and shall install required facilities to the exact requirements of the approved drawing furnished.
- C. Contractor shall notify the architect of his requirements for confirmed locations a reasonable time in advance of construction to permit obtaining such data.
- D. Failure of contractor to perform as described shall make him responsible for costs or changes required to conform to the requirements.

### 3.02 CLEANING UP

- A. This contractor shall be responsible for cleaning up all trash, debris, cartons, crates and other items associated with the work of this division. He shall coordinate with the general contractor any special clean-up provisions required by the general contractor.
- B. Any work area not kept cleaned to the point the condition presents a safety or fire hazard to the project, will be called to the contractor's attention for immediate remedy.

### 3.03 FINAL INSPECTION

- A. Final inspection will be scheduled by the architect when he has determined the project is ready for final inspection.
- B. The final inspection may require representatives of the mechanical contractor and his various sub-contractors to be present. Proper notification will be given by the architect advising the date and time of the final inspection and the representatives required from the various sub-contractors.

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EOS

## SECTION 15020 - BASIC MECHANICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

### PART 2 - PRODUCTS

#### 2.01 SUBSTITUTIONS

- A. For products specified herein, bids shall be based on products named in project manual or on plans, or on items designated as an "approved equal". A product not named in project manual or on plans will only be acceptable when such product meets all other requirements of project specifications, including specifications of originally specified products' manufacturer as of date of contract documents and request has been made for product substitution.

The first manufacturer listed in these specifications and the manufacturer and catalog number listed in the equipment schedules was used for design, layout, performance, physical size, space and structural requirements, electrical requirements and general appearance. Any equipment selected from the approved alternate list of manufacturers must be compatible with the facility and meet all requirements of the contract documents. Any changes required due to the alternate selected equipment being different from the design basis equipment, shall be the responsibility of the mechanical contractor and he shall pay for any increased costs as a result of these changes.

- B. Requests for architects approval of a product as equal will not be considered unless sufficient data for evaluation is received seven (7) days prior to the bid opening date.

### PART 3 - EXECUTION

#### 3.01 PIPING AND DUCTWORK ROUTING

- A. All piping and ductwork in finished areas, except where noted to the contrary, shall be installed in chases, furred spaces, above ceilings, etc. In all cases, pipes and ducts shall be installed as high as possible. Runs of piping shall be grouped whenever it is feasible to do so.
- B. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of

electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panelboards, power panels, motor control centers, or dry type transformers:

1. Within 42" in front (and rear if free standing) of equipment; or
2. Within 36" of sides of equipment. Clearances apply vertically from floor to structure.

Provide access to equipment and apparatus requiring operation, service or maintenance within the life of the system, including, but not limited to, motors, valves, filters, dampers, shock absorbers, etc. Equipment located above lay-in type ceilings is considered accessible.

### 3.02 EXCAVATION, TRENCHING AND BACKFILLING

- A. Perform all excavation, trenching and backfilling for work under Division 15. During excavation, material for backfilling shall be piled back from the banks of the trench to avoid overloading and to prevent slides and cave-ins. All excavated materials not to be used for backfilling shall be removed and disposed of. Grading shall be done to prevent surface water from flowing into trenches and other excavations and any water accumulating therein shall be removed by pumping. All excavations shall be made by open cut.
- B. Bottom of trench shall be uniformly graded to provide firm support and even bearing surface for pipe.
- C. Pipe shall be laid on firm soil, laid in straight lines and on uniform grades. Provide bell holes so that barrels of pipe rest evenly on bottom of trench along entire length of pipe.
- D. Pipe shall be inspected and tested prior to backfilling. No roots, rocks or foreign materials of any description shall be used in backfilling the trenches. Trench shall be hand filled to a minimum of twelve (12) inches above the top of the pipe with clean earth and tamped to 95 percent compaction after first layer using the test method of compaction specified in Division 1.

### 3.03 DEWATERING

- A. Contractor shall perform all work necessary to lower and control the ground water levels and hydrostatic pressures to permit all excavation, backfill, and construction to be performed in the dry. The control of all surface water shall be considered as part of the work under this system. Dewatering may be required where trenches are deep.

- B. Dewatering system shall be of sufficient size and capacity necessary to lower and maintain the ground water table to an elevation at least one foot below the bottom of pipe trench and to allow all materials to be excavated in a reasonably dry condition. The materials to be removed shall be sufficiently dry to permit excavation to the grades shown to stabilize the excavation slopes where sheeting is not required. The dewatering system shall be operated continuously until backfill work has been completed.
- C. Reduce the hydrostatic head below any excavation to the extent that the water level in the construction area is a minimum of one foot below the prevailing excavation surface.
- D. Maintain stability of the sides and bottom of the excavation.
- E. The control of all surface and sub-surface water are part of the dewatering requirements. Maintain adequate control so that the stability of excavated and constructed slopes are not adversely affected by water, that erosion is controlled and that flooding of excavations or damage to the structures does not occur. Drain surface water away from the excavations.

#### 3.04 MOTORS

- A. Unless specifically noted otherwise in other sections of this specification, all motors and motor controllers shall meet the requirements specified in this section. All motors shall be built in accordance with the current applicable IEEE, ASA, and NEMA standards.
- B. Each motor shall be suitable for the service of the driven unit, rated with 1.15 minimum service factor. The motor temperature rise shall not exceed 40 degrees C. for drip proof motors, 50 degrees C. for splash proof motors, and 55 degrees C. for totally enclosed or explosion proof motors. The motor shall be capable of operating continuously at such temperature rises, and shall be capable of withstanding momentary overloads of 25 percent without injurious overheating. The motors provided shall operate at no greater than the motor nameplate horsepower at nameplate service factor.
- C. Each item of motor driven equipment shall be furnished complete with the motors and drives as required to perform the specific function for which it is intended, scheduled, and specified.
- D. Motors shall be ball bearing type selected for quiet operation and shall be manufactured for general purpose duty unless otherwise indicated. Each bearing shall be accessible for lubrication and designed for the load imposed by the V-belt drive or the driven apparatus. Direct drive motors shall be designed for the specific application with all necessary thrust bearings, shaft capacities, etc.

### 3.05 PAINTING

- A. Factory painted equipment that has been scratched or marred shall be repainted to match original factory color.
- B. All un-insulated black ferrous metal items exposed to sight inside the building, such as standpipes, equipment hangers and supports, shall be cleaned and painted with one (1) coat of zinc chromate primer. In addition, such items in finished spaces shall also be painted with two (2) coats of finish paint in a color to match adjacent surfaces or as otherwise selected by the architect.
- C. Black ferrous metal items exposed outside the buildings, such as uninsulated pipe and pipe supports not provided with factory prime coat, shall be cleaned and painted with one (1) coat of rust inhibiting primer and two (2) coats of an asphaltic base aluminum paint.
- D. In lieu of painting hanger rods, cadmium plated or galvanized rods may be furnished.
- E. No nameplates or equipment shall be painted, or suitable protection shall be afforded to the plates to prevent their being rendered illegible during the painting operation.
- F. Galvanizing broken during construction shall be recoated with cold galvanized compound.
- G. All ductwork, piping, insulation, conduit or other appurtenances visible through grilles and diffusers shall be painted flat black.

### 3.06 CUTTING AND PATCHING

- A. The contractor shall assume all cost of, and be responsible for, all cutting required to complete the installation of his portion of the work. All cutting shall be carefully and neatly done so as not to damage or cut away more than is necessary of any existing portions of the structure. Concrete patching shall be by general contractor.
- B. All surfaces shall be patched to the condition of the adjacent surfaces by the general contractor.
- C. The contractor shall make suitable provisions for adequately waterproofing at his floor penetrations of waterproof membrane floors. This shall include but not be limited to floor drains, open sight drains, hub drains, cleanouts, and sleeves for the various piping. This also applies to membrane roofing systems.

### 3.07 SLEEVES

- A. Pipes passing through floor slabs (except grade slabs) shall pass through 16 gauge galvanized metal sleeves. The top of the sleeve shall extend 1" above finished floor and the bottom shall be flush with the underside of the floor slab.
- B. Floor sleeves shall allow sufficient room for the pipe or pipe and insulation to pass and leave a 1/2" or greater space between the sleeve and the pipe or pipe insulation. This space shall be caulked with material to meet fire rating of the floor or maintain air-tight, watertight seals.
- C. Sleeves for concrete or masonry walls, grade beams, etc. shall be made of schedule 40 black steel pipe and shall be installed to fit flush with each side of wall or beam. Sleeves placed below grade shall be caulked with oakum between the sleeve and the pipe passing through the sleeve. Wall sleeves above grade or on the interior walls of the building shall be caulked between the sleeve and the pipe passing through the sleeve so that the fire rating of the wall is maintained or so that air or moisture can not pass through the sleeve.

### 3.08 ESCUTCHEONS

- A. Escutcheons shall be installed on all pipes where they pass through floors, ceilings, walls, or partitions in finished areas.
- B. The interior of closets, adjacent to finished areas, shall be considered as finished for the intent of these specifications.
- C. Escutcheons shall be split, hinged, stamped brass type designed to fit the pipe, and to cover the terminating pipe sleeve, in chrome plated finish unless otherwise specified, with securing device to hold the escutcheon tight to the pipe.

### 3.09 CLEANING

- A. Flush new water piping systems until water runs clean. Mild chemical cleaning may be required. If so, flush all cleaning chemicals out of the piping system before recharging with water.
- B. Remove all stickers, rust, stains, labels, and temporary covers before final acceptance.
- C. The exterior surfaces of all mechanical equipment, piping, ducts, etc. shall be cleaned of all grease, oil, paint, dust and other construction debris.
- D. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces.

- E. Bearings that require lubrication shall be lubricated in accordance with the manufacturer's recommendations. Provide written certification of lubrication.
- F. Equipment rooms shall be left broom clean.
- G. Any fans operating during construction shall have temporary filters. Temporary filters shall be changed regularly to prevent contamination of the equipment and duct systems. Permanent filters shall be installed prior to final inspection.

### 3.10 GUARANTEE

- A. All systems and components shall be provided with a one year guarantee from the time of final acceptance. The guarantee shall cover all materials and workmanship. During this guarantee period, all defects in materials and workmanship shall be corrected by repair or replacement without incurring any additional cost.
- B. All air conditioning compressors shall be guaranteed for an additional four years or as specified in equipment sections. This additional guarantee shall include parts only.

### 3.11 ACCESS DOORS:

- A. Furnish and install access doors at each point required to provide access to concealed valves, cleanouts, fire dampers and other devices requiring operation, adjustment, or maintenance. Access doors shall be 24 gauge galvanized steel, with mounting straps, concealed hinges and locks, designed for the doors to open 180 degrees, equal to Ruskin ADH2. Doors installed in insulated ductwork shall be insulated.
- B. Access doors installed in fire walls or partitions shall be U.L. labeled to maintain the fire rating of the wall or partition.

### 3.12 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flamespread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flamespread rating not over 25 and a smoke developed rating not higher than 50. (Note: Materials need not meet these requirements where they are entirely located outside of a building and do not penetrate a wall or roof, and do not create an exposure hazard).

- B. Piping, duct, insulation, wiring and other materials placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall have a flamespread of not more than 25 and a smoke developed rating of not more than 50. All such materials shall meet the requirements of noncombustible building materials as defined by the Standard Building Code or the material shall be enclosed within a fire resistant assembly meeting the noncombustible requirements.
- C. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc., "Building Materials List" under the heading "Hazard Classification (Fire)".

### 3.13 EQUIPMENT FURNISHED BY OWNER

- A. The contractor shall unload, uncrate, assemble, and connect any and all equipment shown on the drawings or called out in the specifications to be furnished by the owner for installation by the contractor.
- B. The contractor shall take full charge of such equipment from the time the items are delivered to the job, set in place, connected, tested, adjusted, and placed into operation.

### 3.14 HAZARDOUS MATERIALS

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this Specification Division 15. Any requirements for such are beyond the scope of this contract and shall be done only by those persons contracted to do so.

### 3.15 BUILDING SERVICES

- A. It is the intention of the drawings that the plumbing contractor be responsible for the final connection of all sanitary sewer, domestic water, and other services to the building.

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EOS



## SECTION 15030 - MECHANICAL SUBMITTAL DATA

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

- A. The requirements of the general conditions, supplementary conditions, and Section 15010 apply to all work herein.

#### 1.02 QUALITY ASSURANCE

- A. Shop drawings or fully descriptive catalog data shall be submitted by the contractor for all items of material and equipment furnished and installed under this contract. The contractor shall submit to the architect a sufficient number of copies of all such shop drawings or catalog data to provide him with as many review copies as he may need, plus two (2) copies for retention; one by the architect and one by the engineer.
- B. Before submitting shop drawings to the architect for review, the contractor shall examine them and satisfy himself that they are correctly representative of the material or equipment to which they pertain. The contractor shall note these drawings before submitting them. The contractor's review of the shop drawings is not intended to take the place, in any way, of the official review by the architect, and shop drawings which have not been reviewed by the architect shall not be used in fabricating or installing any work.
- C. The review of shop drawings or catalog data by the architect shall not relieve the contractor from responsibility of deviations from the plans and specifications unless he has, in writing, specifically called attention to such deviations at the time of submission and has obtained the permission of the architect thereon; nor shall it relieve him from responsibility for error of any kind in shop drawings.
- D. Verification and assignment of dimensions, quantities, and construction means, methods, sequences or procedures, the correctness of which is set forth in the contract documents or submittal, shall be the sole responsibility of the contractor.
- E. Reproduction of design documents in any portion for use in a submittal is not acceptable.

#### 1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Furnish submittal data consisting of shop drawings, brochures, samples, etc. as defined herein, as indicated on the drawings and as specified herein before purchasing material or performing any installation unless directed by the architect in writing. Work performed or material purchased before the applicable shop

drawing has been reviewed and accepted by the engineer is entirely at the risk and expense of the contractor.

- B. Any costs incurred due to nonconformance of the contract documents shall not increase the contract sum.
- C. The contractor shall submit certification and mechanical/electrical coordination letters with the submittals as specified herein.
- D. Resubmittals are due within ten (10) working days from receipt.

#### 1.04 ENGINEER'S RESPONSIBILITIES

- A. In general the submittal data review period (both initial and resubmittal) shall be ten (10) working days from receipt; however, ductwork, piping and temperature control fabrication drawings shall be reviewed within fourteen (14) working days from receipt.
- B. The engineer's review of these submittals is only for the limited purpose of checking the same for conformity with the design concept of this work as established by the contract documents. This review is not intended to be for the purpose of determining the accuracy of other matters that are contained in such submittals.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All products shall be new and bear all labels which are identified by the applicable specification section and contract documents.

### PART 3 - EXECUTION

#### 3.01 SUBMITTAL DATA

- A. General
  - 1. The submittal data to be furnished for this project shall comply with the specifications and contract documents in their entirety. Any submittals herein scheduled are as a minimum only and shall not be construed to limit the submittal data required within the individual sections of these specifications.
  - 2. Shop drawings will be returned unchecked unless the following information is included: Reference to all pertinent data in the specifications or on the drawings, such as sound power levels of motor

driven equipment where called for in the specifications, electrical characteristics and horse power, capacities, construction material of equipment, UL Labels where required, accessories specified, manufacturer, make and model number, weights where specified, starters where required by Division 15, size and characteristics of the equipment, name of the project and a space large enough to accept an approval stamp. The data submitted shall reflect the actual equipment performance under the specified conditions and shall not be a copy of the scheduled data on the drawings. All submitted equipment must be identified on shop drawings with same "Mark Numbers" as identified on drawings or in specifications. All pertinent data such as accessories shall also be marked. Any deviation from any part of the contract documents shall be clearly and completely highlighted.

3. HVAC and plumbing submittal data shall be bound into separate HVAC and plumbing volumes, with each volume containing one copy of all specified equipment shop drawings. The binders shall be provided with an identification tab for each specification section that requires submittals. Each item in each tabbed section shall be identified with the paragraph number relating to the item submitted by the use of a cover sheet or by highlighting the paragraph on the first page concerning the item. If necessary, binders shall be submitted with the original submittal data and will address and resolve all comments thereon. All submittals shall include identification tabs and sufficient space for all submittal data.

FAILURE to provide BOUND AND IDENTIFIED SUBMITTALS will result in the AUTOMATIC REJECTION of the submittal data with NO EXCEPTION.

4. The bound submittals are to be submitted for review within 30 days after the contract is awarded. No submittal will be checked until ALL required submittals have been received by the engineer. Only Automatic Temperature Controls, ductwork and piping fabrication drawings may be submitted after the complete and bound submittal is reviewed and accepted by the engineer.
5. The contractor shall submit with the bound and identified submittal data a letter signed by the contractor's Project Manager (or higher level officer of the firm) stating that all electrical characteristics of the mechanical equipment to be supplied have been fully coordinated with the electrical contractor. No submittal data will be checked until this letter is submitted. Any changes to the electrical requirements from the contract documents resulting from alternate equipment being submitted shall be performed without any additions to the contract sum. Shop drawings shall be submitted for each of the following when equipment is included as part of the mechanical installation:

## HVAC

Air Handlers

Automatic Temperature Controls (Cuts of Instruments, Controllers and Valves, Description of System Operation, Ladder Diagram, Control Wiring Diagram from Terminal to Terminal, Control Systems Power Requirements)

Condenser Units

Cooling/Heating Equipment

Curbs

Dampers

Duct Access Doors

Electric Heating Units

Exhaust Fans

Flexible Duct

Grilles, Registers and Diffusers

Hangers

Insulation

Louvers

Motor Starters

Refrigerant Specialties

Sprinkler System Drawings, Calculations, Cut Sheets

Through-wall Air Conditioning Units

## PLUMBING

Backflow Preventers

Cleanouts (Floor, Grade, Wall)

Drinking Fountains

Gas Cocks

Handicap Fixtures

Hot Water Generators

Hydrants

Insulation

Plumbing Fixtures, Carriers, Trim

Pumps

Pressure Gauges, Cocks, Snubbers

Trap Primers

Water Heaters

### 3.02 OPERATING AND MAINTENANCE INSTRUCTIONS

#### A. DESCRIPTION

1. Complete operating and maintenance instructions shall be provided to the owner. Four (4) separate copies (three for the owner, one for the architect) shall be provided, and each copy shall be bound in a separate 3-ring, loose leaf notebook. Operating instructions shall be provided for each system, and shall include a brief system description, a simple schematic and a sequence of operation. Operating and maintenance instructions shall be included for each piece of equipment. Manufacturer's standard literature is acceptable for each piece of equipment. However, the contractor shall prepare a SYSTEM O&M manual including overall system descriptions, operating and energy conservation techniques.
2. A system wiring and control diagram shall be included in the operating and maintenance instructions.
3. Prior to final acceptance or beneficial occupancy, provide the services of a competent representative to instruct the owner in the operation of all systems. This instruction shall include a complete walk-through of all equipment and systems. The architect/engineer reserves the right to attend any such meeting and shall be duly notified.

### 3.03 OTHER SUBMITTALS

- A. Submit or provide the following prior to occupancy of the project by the owner:
  1. As built drawings for ductwork, HVAC piping, plumbing and utilities.
  2. All warranties.
  3. Certify disinfection of domestic water service by proper authority.
  4. Provide start-up, test and balance report, as specified.
  5. Manufacturer's representative shall certify that HVAC equipment is installed in accordance with the manufacturer's recommendations.

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EOS

## SECTION 15060 - PIPE, FITTINGS AND JOINING PROCEDURES

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide all material, equipment and labor, etc. required to complete installation specified and/or shown or scheduled on plans.
- B. Work included:
  - 1. Pipes, fittings, unions, couplings, flanges, gaskets, and other materials and instructions.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15010 - General Conditions for Mechanical Work
- B. Section 15020 - Basic Mechanical Requirements
- C. Section 15100 - Valves
- D. Section 15120 - Piping Specialties
- E. Section 15140 - Hangers, Supports and Anchors
- F. Section 15190 - Mechanical Identification
- G. Section 15250 - Mechanical Insulation

#### 1.03 APPLICABLE STANDARDS

- A. American Society of Testing and Materials
- B. CS - Commercial Standards
- C. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
- D. ANSI
- E. Piping furnished as part of factory-fabricated equipment is specified as part of the equipment assembly under other Division 15 sections.

## PART 2 - PRODUCTS

### 2.01 PIPING AND FITTING MATERIALS

- A. General: Provide pipe tube and fittings of type, joint type, grade, size and weight (wall thickness or class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.
- B. All fittings shall conform to pipe as to black steel, PVC plastic, copper or cast iron, etc. or as indicated. Fittings and accessories shall have equal or greater pressure rating than piping specified for specific application. Piping materials placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall have a flamespread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E84. All such materials shall meet the requirements of noncombustible building materials as defined by the Standard Building Code or the material shall be enclosed within a fire resistant assembly meeting the noncombustible requirements.
- C. Malleable steel fittings will be 150 psi, with unions having bronze to iron ground joints.
- D. Furnish and install unions or mating flanges at all connections to each piece of equipment conveniently located to facilitate quick and easy disconnecting of equipment. Flanges or union connections shall be used on both sides of traps, control valves, pressure reducing valves and meters and the like.
- E. Provide ground joint union, factory made reducers and increasers, and nipples of comparable materials as the piping with which it is installed and capable of withstanding the same working pressure. The use of bushings is not acceptable to obtain reduction or increase in sizes.
- F. Provide dielectric fittings where copper and ferrous metal are joined.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. General: Install pipe, tube and fittings in accordance with recognized industry practices which will achieve permanently leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B30 Code for Pressure Piping.

- B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations, or if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1.0" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- C. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures unless unavoidable.
- D. Piping System Joints: Provide joints of type indicated in each piping system.
1. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.
  2. Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B30.
  3. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
  4. Mechanically Formed Tee Connections: In lieu of providing tee fittings in copper tubing, installer may, as option, provide mechanically formed tee connections, providing they are in accordance with the following:
    - A. Size and wall thickness of both run tube and branch tube are listed by manufacturer of forming equipment as "Acceptable Application".
    - B. Height of drawn collar is not less than 3 times wall thickness of run tubing.



- C. End of branch tube is notched to conform to inner curve of run tube, and dimpled to set exact penetration depth into collar.
  - D. Resulting joint is minimum of 3 times as long as thickness of thinner joint member, and brazed using B-cup series filler metal.
5. Mechanically Formed Couplings: In lieu of providing couplings in copper tubing, installer may, as option, provide mechanically formed couplings, provided they are in accordance with the following:
- A. Form couplings by first annealing area at end of tube where expansion will occur. Insert tube expander to die size required and expand tube end to accept tubing of same size.
  - B. Resulting joint is minimum of 3 times as long as thickness of tube, and brazed using B-cup series filler metal.
6. Weld pipe joints in accordance with recognized industry practice and as follows:
- A. Weld pipe joints only when ambient temperature is above 0 degrees F where possible. Bevel pipe ends at a 37.5 angle, smooth rough cuts, and clean to remove slag, metal particles and dirt.
  - B. Use pipe clamps or tack-weld joints with 1" long welds; 4 welds for pipe sizes to 10", 8 welds for pipe sizes 12" to 20".
  - C. Build up welds with stringer-bead pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.
  - D. Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.
  - E. At installer's option, install forged branch-connection fittings wherever branch pipe of size smaller than main pipe is indicated; or install regular "T" fitting.
7. Weld pipe joints of steel water pipe in accordance with AWWA C206.
8. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

9. Lead Joint Installation: Tightly pack joint with joint packing material. Do not permit packing to enter bore of finished joint. Clean joint after packing. Fill remaining joint space with one pouring of lead to indicated minimum depth measured from face of bell. After lead has cooled, caulk joint tightly by use of a hammer and caulking iron.
10. Hubless-Cast-Iron Joints: Comply with coupling manufacturer installation instructions.
11. Clay Pipe Joints: Comply with ASTM C12.
12. Plastic Pipe/Tube Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards:
  - A. Heat Joining of Thermoplastic Pipe: ASTM D2657.
  - B. Making Solvent-Cemented Joints; ASTM D2235 and ASTM F402.
13. Glass Pipe Joints: Comply with manufacturer's instructions and recommendations.

### 3.02 CLEANING, FLUSHING AND INSPECTING

- A. General: Clean interior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items. Inspect pressure piping in accordance with procedures of ANSI B30.
- B. Disinfect water mains and water service piping in accordance with AWWA C601 and local authority.

### 3.03 PIPING TESTS

- A. Notify architect/engineer at least 24 hours before performing leak test.
- B. Provide temporary equipment for testing, including pumps and gages. Test piping system before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for system at 150% of operating pressure indicated, but not less than 25 psi test pressure. Observe each test execution for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.

- C. Repair piping system sections which fail required piping test by disassembly and re-installing, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

#### 3.04 THRUST BLOCKS

- A. All changes in direction of underground fiberglass or plastic pressure systems for 2" and larger systems shall be encased in concrete (3000 psi) thrust blocks to provide anchor points for direct expansion and contraction. All water main piping underground shall have thrust blocks installed at changes in direction or tee branches.

#### 3.05 MANUFACTURER'S ASSISTANCE

- A. Manufacturer shall provide, if required, a factory trained service man to properly train contractor's personnel in all phases of installation.

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EOS

## SECTION 15070 - PIPING SCHEDULE

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide piping systems as specified and shown on drawings in accordance with Section 15060.
- B. Provide optional systems for different code requirements only if approved by engineer prior to beginning installation of piping.
- C. Piping materials placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E84. All such materials shall meet the requirements of noncombustible building materials as defined by the Standard Building Code or the material shall be enclosed within a fire resistant assembly meeting the noncombustible requirements.

#### 1.02 APPLICABLE STANDARDS

- A. ASTM - American Society of Testing and Materials
- B. CS - Commercial Standards
- C. ASME - American Society of Mechanical Engineers
- D. AWWA - American Water Works Association

### PART 2 - PRODUCTS

#### 2.01 PIPING SCHEDULE

- A. Sanitary waste and vent and storm drain piping above slab within building:
  - 1. Pipe size 10" or smaller: No-hub cast iron soil pipe, CISPI 301.
    - a. Pipe Class: Service weight (SV).
    - b. Fittings: No-hub cast iron soil pipe fittings, CISPI 301 with stainless steel clamps and Neoprene gaskets.
    - c. Gaskets: Neoprene gasket joints, ASTM C-564.
    - d. Couplings: "Husky" heavy duty stainless steel clamps, CISPI 301.

2. Option if allowed by local code authorities and if in compliance with Section 15020-3.12 A, B, and C where applicable:

Schedule 40 PVC with solvent weld fittings or mechanical joint fittings.

- B. Sanitary waste and vent and storm drain piping underground; sanitary waste and vent above ground larger than 10":

1. Pipe: Cast iron, hub and spigot soil pipe, ASTM A74.

- a. Pipe Class: Service weight (SV).
- b. Fittings: Cast iron, hub and spigot soil pipe fittings.
- c. Gaskets: Neoprene compression gasket joints, ASTM C-564.

2. Option if allowed by local code authorities and if in compliance with Section 15020-3.12 A, B, and C where applicable.

Schedule 40 PVC with solvent weld fittings or mechanical joint fittings.

- C. Domestic water piping; above ground:

1. Domestic water mains located in corridors, floor to floor risers and within mechanical rooms:

- a. All size, copper tube, containing less than 8.0% lead.
- b. Fittings:
  - i. Wrought copper or cast bronze.
  - ii. Copper press fittings as manufactured by Viega and used in accordance with Ridgid "Pro Press System." Copper press fittings shall conform to the material and sizing requirements of ASME B.16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
  - iii. Mechanically formed tee fittings, as created by T-Drill, is an acceptable method of installation. All joints created in this manner shall be installed and brazed in accordance with manufacturer's instructions.

2. Domestic water piping for branch lines to fixtures in public areas and guest rooms. (ONLY IF ALLOWED BY LOCAL PLUMBING INSPECTOR)

- a. Cross-linked polyethylene (PEX) tubing and applicable fittings in accordance with ASTM F877, NSF 14 and NSF 61.
- b. Acceptable manufacturers:

- i. Rehau Raupex piping with Everloc fittings.
    - ii. Wirsbo Aquapex piping with ProPEX fittings.
  - 3. It is intended that all domestic water mains and risers be Type L copper with wrought copper fittings and solder joints or Viega fittings with Ridgid Pro-Press system. From the above ceiling corridor mains to each guest room run out to the fixtures may be PEX tubing.
- D. Domestic Water Underground:
- 1. Tube size 1/2" through 2": Copper tube, containing less than 8.0% lead.
    - a. Wall Thickness: Type K, soft-annealed temper.
    - b. Fittings: Wrought copper or cast bronze.
    - c. Solder: Silver solder containing not more than 0.2% lead.
  - 2. Tube size 2-1/2" through 4": Same as Item #1 above except Type K hard drawn copper.
  - 3. Pipe size larger than 4": Ductile-iron pipe, with cement-mortar lining, push-on joints.
    - a. Pipe weight: Class 50.
    - b. Fittings: Class 250 ductile-iron, mechanical joints.
    - c. Option if allowed by local code authorities:

PVC pipe C-900, Class 150, SDR-18 for pipe larger than 4".
- E. Condensate drains (HVAC), equipment drains, relief valve discharge drain piping:
- 1. All sizes copper water tube.
    - a. Type L.
    - b. Fittings: Wrought copper or cast bronze.
    - c. 50/50 solder.
  - 2. Option if allowed by local code authorities and if in compliance with Section 15020-3.12 A, B, and C where applicable:

Schedule 40 PVC for condensate drains.

F. Refrigerant piping - above slab:

1. All sizes.
  - a. Type ACR hard drawn copper tubing.
  - b. wrought copper fittings.
  - c. silver solder brazed joints.

G. Refrigerant piping - below slab:

1. All sizes.
  - a. Type ACR soft drawn copper tubing, no joints below slab.

H. Natural gas piping - above ground:

1. Pipe size up to and including 2":
  - a. Type: Black steel pipe.
  - b. Class: Schedule 40, ASTM A-53.
  - c. Fittings: Class 150 malleable iron threaded.
  - d. Joints: Threaded.
2. Pipe size 2-1/2" and larger:
  - a. Type: Black steel pipe.
  - b. Class: Schedule 40, ASTM A-53.
  - c. Fittings: Standard weight wrought steel, butt-welded fitting.
  - d. Joints: Buttwelded.

I. Natural gas piping - underground:

1. All pipe sizes 1/2" and larger:
  - a. Type: Black steel, Schedule 40.

- b. Wrap: Machine wrapped X-Tru-Coat, hand wrap joints.
  - c. Joints: Butt-weld.
- 2. Option: Pipe sizes 1/2" through 12":
  - a. Thermoplastic gas pressure pipe.
  - b. Tubing and fittings complying with ASTM D 2513.
  - c. High and medium pressure piping outside of building and below grade from meter/regulator to gas main connection shall be Schedule 40 polyethylene and shall conform to the requirements of thermoplastic pipe as outlined in ANSI 31.8 for gas transmission. Riser to meter and extending five feet horizontally below grade shall be black steel pipe with asphalt based coating and plastic jacketed anodeless riser.

### PART 3 - EXECUTION

#### 3.01 TESTING

- A. Sanitary waste and vent piping - in accordance with local code, minimum 10ft. water column.
- B. Domestic water piping - 150 psig for 4 hours.
- C. Refrigerant piping - 250 psig for 4 hours.
- D. Natural gas piping – 100 psig for 4 hours.

#### 3.02 IDENTIFICATION

- A. All piping to be identified with permanent markers as to service. (See Section 15190).
- B. Provide copper wire tracer for underground non-metallic piping. Place on pipe prior to backfill. (See Section 15190, 3.01 D.)

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EOS



## SECTION 15100 - VALVES

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Types of valves specified in this section include gate valves, globe valves, drain valves, ball valves, butterfly valves, check valves, and refrigerant block valves.

#### 1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Valves furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.

#### 1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service.
- B. Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.
- C. Valve Listing: For valves on fire protection piping, provide listing by UL and Associated Factory Mutual Fire Insurance Companies.
- D. Valves Installed in Boiler Rooms: Comply with ASME Boiler and Pressure Vessel Code where applicable.
- E. Valve Types: Provide valves of same type by same manufacturer.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030.
- B. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve.
- C. Maintenance Data: Submit maintenance data and spare parts lists for each type of valve.

### PART 2 - PRODUCTS

#### 2.01 GATE VALVES

- A. Crane Co., Nibco, Inc., Powell (WM) Co., Stockham Valves and Fittings, Inc. or Walworth Co.
- B. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
- C. For Domestic Water Service
  - 1. Threaded Ends 2" and Smaller: Class 125, bronze body, union bonnet, rising stem, solid wedge.
  - 2. Flanged Ends 2-1/2" and Larger: Class 125, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge.
  - 3. Soldered Ends 2" and Smaller: Class 125; bronze body, screwed bonnet, nonrising stem, solid wedge.

## 2.02 GLOBE VALVES

- A. Crane Co., Nibco, Inc., Powell (WM) Co., Stockham Valves and Fittings, Inc., or Walworth Co.
- B. Packing: Select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
- C. Composition Discs: Where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut. For metal seated globe valves, provide hardened stainless steel disc and seat ring.
- D. For Domestic Water Service
  - 1. Threaded Ends and Smaller: Class 150, bronze body, union bonnet, rising stem, composition disc.
  - 2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem, composition disc.
  - 3. Flanged Ends 2-1/2" and Larger: Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc.

## 2.03 DRAIN VALVES

- A. Crane Co., Nibco, or Walworth Co.
- B. For low Pressure Drainage Service:
  - 1. Threaded Ends 2" and Smaller: Class 125, bronze body screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
  - 2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed bonnet, rising stem composition disc, 3/4" hose outlet connection.

#### 2.04 BALL VALVES

- A. Select with port area equal to or greater than connection pipe area, include seat ring designed to hold sealing materials. Crane Co., Appolo, Stockham Valves and Fittings, Inc., or Walworth Co.
- B. For Domestic Water Service
  - 1. Threaded Ends 2" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.
  - 2. Soldered Ends 2" and Smaller: Class 125, bronze 2 piece body, bronze ball, bronze stem.

#### 2.05 BUTTERFLY VALVES

- A. Provide only lug type valves. Provide gear operators on butterfly valves 8" and larger. Acceptable manufacturers are Crane Co., Jenkins Bros., Metraflex, Dezurick, Nibco, Red-White.
- B. For Domestic Water Service: Lug type 3" and Larger: Class 150, ductile iron body, lever operated, cadmium plated ductile iron disc, Type 410 stainless steel stem, nitrile rubber seat.

#### 2.06 SWING CHECK VALVES

- A. Crane Co., Metraflex, Walworth Co., Nibco, or Red-White.
- B. Provide stop lug as renewable stop for disc hanger, unless otherwise specified. Construct disc and hanger as separated parts, with disc free to rotate. Support hanger pins on both ends by removable side plugs.
- C. For Domestic Water Service
  - 1. Threaded Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.

2. Soldered Ends 2" and Smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
3. Flanged Ends 2-1/2" and Larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast-iron disc.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Except as otherwise indicated, comply with the following requirements:
  1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
  2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plan unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- C. Applications Subject to Shock: Install valves with bodies of metal other than cast iron where thermal or mechanical shock is indicated or can be expected to occur.
- D. Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator. Install bronze valves in steam and condensate service and in other services where corrosion is indicated or can be expected to occur.
- E. Mechanical Actuators: Install mechanical actuators with chain operators where indicated, and where valves 4" and larger are mounted more than 7'-0" above floor in mechanical rooms, boiler rooms; and where recommended by valve manufacturer because of valve size, pressure differential or other operating condition making manual operation difficult.
- F. Fluid Control: Except as otherwise indicated, install gate, ball, globe, and butterfly valves to comply with ANSI B31.1 Where throttling is indicated or recognized as principal reason for valve, install globe or butterfly valves.
- G. Installation of Check Valves:

1. Swing Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

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EOS

## SECTION 15120 - PIPING SPECIALTIES

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of piping specialties required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of piping specialties specified in this section include pipe escutcheons, pipeline strainers, dielectric unions, manual air vents, balance cocks, relief valves, and backflow preventers.

#### 1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Piping specialties furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.

#### 1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service.

#### 1.04 SUBMITTALS: Comply with Section 15030

- A. Product Data: Submit catalog cuts, specifications, and installation instruction for each type of manufactured piping specialty. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location and features for each required piping specialty.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURED PIPING SPECIALTIES

Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is installer's option.

- A. Pipe Escutcheons: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
- B. Y-Type Pipeline Strainers: Provide strainers full line size of connecting piping, with end matching piping system materials. Select strainers for 125 psi working pressure, with Type 304 stainless steel screens, with 3/64" perforations @ 233 per sq. in. Armstrong Machine Works, Hoffman Specialty, Metroflex Co., Trane Co., Spirax Sarco Co.
1. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted pipe plug.
  2. Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
- C. Dielectric Unions: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion. B&K Industries, Capital Mfg. Co., EPCO Sales, Inc., Perfection Corp.
- D. Balance Cocks: Bell & Gossett, Sarco Co. or Taco, Inc., balance cocks as indicated, of one of the following types:
1. Threaded End 2" and Smaller: Class 125, bronze body, bronze plug, screwdriver operated, straight or angle pattern.
  2. Soldered Ends 2" and Smaller: Class 125, bronze body, bronze plug, screwdriver operated, straight or angle pattern.
- E. Vents Valves: Taco, Armstrong Machine Works, Bell & Gossett, or Sarco Co.
1. Manual Vent Valves: Provide manual vent valves, where indicated or required, designed to be operated manually with screwdriver or thumbscrew, 1/8" N.P.T. connection.
  2. Automatic Vent Valves: Provide automatic vent valves, only where indicated on drawings, designed to vent automatically with float principle, stainless steel float and mechanisms, cast-iron body, pressure rated for 125 psi, 1/2" N.P.T. inlet and outlet connections.

- G. Water Relief Valves: Provide water relief valves as indicated, of size and capacity as selected by installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code. Amtrol, Inc., Bell & Gossett, Sarco Company or Watts Regulator Company.
1. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 Listing Requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F., and pressure relief at 125 psi.
- H. Pressure Reducing Valves: Provide pressure reducing valves as indicated, of size and capacity as selected by installer to maintain operating pressure on system. Hoffman, Taco or equal.
1. Construction: Cast iron or brass body, low inlet pressure shut-down, noncorrosive valve seat and stem, factory set at operating pressure.
- I. Backflow Preventer: Reduced pressure type consisting of two separate spring loaded "Y" diaphragms separated by a spacer to automatically reduce the pressure in the zone between the check valves, should the differential between the upstream and the zone of the unit drop to 2 psi, the differential relief valve shall open and maintain the proper differential pressure. Both check valves and the relief valve must be serviceable without removing the device from the line. Gate valves shall be installed on each side of backflow preventer.
- Backflow preventers 2" and smaller shall have bronze bodies with bronze trim; those 2-1/2" and larger shall have cast iron bodies with internal epoxy coating and bronze trim. All units shall be rated for 150 psi working pressure and temperatures to 140 degrees F., and shall meet the requirements of ASSE Standard 1013, AWWA Standard C-506-78, and USC Foundation for cross connection control and hydronic research. Backflow preventer shall be Watts Series 909 and approved equal.

### PART 3 - EXECUTION

#### 3.01 INSPECTION

- A. Examine areas and conditions under which piping specialties are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

#### 3.02 INSTALLATION OF MANUFACTURED HYDRONIC SPECIALTIES

- A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, wall, partitions, and ceilings where penetration is exposed to view; and on exterior



of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and in flush with adjoining surface.

- B. Y-Type Strainers: Install Y-Type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection. Locate Y-Type strainers in supply line ahead of pumps, steam traps, temperature control valves, pressure reducing valves, temperature or pressure regulating valves, and elsewhere as indicated, if integral strainer is not included in equipment.
- C. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
- D. Balance Cocks: Install on end of each hydronic zone circuit, on discharge of each hydronic pump or as indicated.
- E. Vent Valves
  - 1. Manual Vent Valves: Install manual vent valves on each hydronic terminal at highest point.
  - 2. Automatic Vent Valves: Install automatic vent valves at top of each hydronic riser or as indicated. Install shutoff valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.
- F. Water Relief Valves: Install on hot water generators, and elsewhere as indicated. Pipe discharge to floor drain, open site drain or janitors sink. Comply with ASME Boiler and Pressure Vessel Code.
- G. Pressure Reducing Valves: Install for each system as indicated, and in accordance with manufacturer's installation instructions.
- H. Backflow Preventers: Install for each system in which domestic water is connected to chemically treated or other water systems for non-domestic use. Consult local codes. Pipe discharge to floor drain, open site drain or janitor's sink.

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EOS

## SECTION 15140 - HANGERS, SUPPORTS AND ANCHORS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of supports and anchors, specified in this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of supports and anchors specified in this section include horizontal piping hangers and supports, vertical piping clamps, hanger rod attachments, building attachments, saddles and shields, and equipment supports.

#### 1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Supports, anchors furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.
- B. Concrete housekeeping bases, 15010.

#### 1.03 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of supports and anchors of types and sizes required, whose products have been in satisfactory use in similar service.
- B. Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030. Submit catalog cuts, specifications, installation and instructions for each type of support and anchor.

### PART 2 - PRODUCTS

#### 2.01 HORIZONTAL PIPING HANGERS

- A. Where 2 or more lines run parallel, lines may be supported with angle iron trapeze type hangers properly sized to support load of piping and piping contents.
- B. Individual lines shall be supported using split-ring Grinnell Figure 108 or clevis type hangers Grinnell Figure 260 sized for pipe being supported, including insulation. Provide copper plated hangers Grinnell Figure CT-109 for copper un-insulated lines or in cases where hanger comes in direct contact with copper pipe.

## 2.02 VERTICAL PIPE SUPPORTS

- A. Vertical lines passing through floor slabs shall be supported with riser clamps equal to Grinnell Figure 261. Copper lines coming in contact with the hanger shall be supported with copper plated riser clamps.
- B. Vertical lines requiring support at elbow connections shall be supported using Grinnell Figure 192 pipe stanchion supports.

## 2.03 SADDLES AND SHIELDS

- A. Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory or shop fabricated, for all insulated piping. Size saddles and shield for exact fit to mate with pipe insulation, 12" long.

## 2.04 SUPPORT AND BUILDING ATTACHMENTS

- A. Hangers and supports shall be attached to the building as follows:
  - (1) from wood using coach screw on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheeting. Do not support from roof deck without approval. All hangers, rods, and inserts shall be Underwriters' Laboratories approved for the service intended.
- B. Piping shall not be run within bar joist webbing. Piping shall not rest directly on building structural steel but shall be supported with proper hangers and attachments.

## PART 3 - EXECUTION

### 3.01 PIPING SUPPORT

- A. All hangers for insulated piping shall be sized to accommodate insulation and shield. No hangers for insulated piping may be installed directly on pipe.
- B. Maximum spacing between pipe supports to prevent excessive stress: This does not apply where there are concentrated loads between supports:

|    | Pipe Size  | Rod Dia. | Steel<br>Max. Spac. | Copper<br>Max. Spac. | PVC<br>Max. Spac. |
|----|------------|----------|---------------------|----------------------|-------------------|
| 1. | Up to 1/2" | 1/4"     | 5 ft.               | 4 ft.                | 3-1/2 ft.         |

|    |              |      |        |        |       |
|----|--------------|------|--------|--------|-------|
| 2. | 3/4" - 1"    | 3/8" | 6 ft.  | 5 ft.  | 4 ft. |
| 3. | 1-1/4"       | 3/8" | 7 ft.  | 7 ft.  | 5 ft. |
| 4. | 1-1/2"       | 3/8" | 9 ft.  | 8 ft.  | 5 ft. |
| 5. | 2",2-1/2",3" | 3/8" | 10 ft. | 8 ft.  | 5 ft. |
| 6. | 4" & Larger  | 1/2" | 10 ft. | 10 ft. | 6 ft. |

C. Install hangers and supports complete with necessary bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

D. Provisions for Movements

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion bends and similar units.
2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes.

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EOS

## 15150 - AUTOMATIC SPRINKLER SYSTEM

### PART 1 - GENERAL

#### 1.01 GENERAL CONDITIONS AND SPECIAL CONDITIONS

- A. General and special conditions apply to the work under this section.

#### 1.02 DEFINITIONS

- A. Approved: Unless otherwise stated, materials, equipment or submittals approved by the authority having jurisdiction.
- B. ANSI: American National Standards Institute.
- C. ASTM: American Society for Testing and Materials.
- D. AWS: American Welding Society.
- E. AWWA: American Water Works Association.
- F. Concealed: Where used in connection with installation of piping or conduit and accessories, shall mean "hidden from sight" as in shafts, furred spaces, in soffits or above suspended ceilings.
- G. Contractor: The company awarded the prime contract for this work and any of its subcontractors, vendors, supplies or fabricators.
- H. Engineer: Fred Newton and Company, Inc.
- I. Exposed: Where used in connection with installation of piping or conduit and accessories, shall mean "visible" or "not concealed".
- J. FM: Factory Mutual bulletin FM2-8-N.
- K. Furnish: Supply materials.
- L. GPM: Gallons per minute.
- M. Install: Install materials, mount and connect equipment or assemblies.

- N. NFPA: National Fire Protection Association.
- O. Owner: Hampton Inn Hotel
- P. Provide: Furnish, install and connect.
- Q. PSI: Pounds per square inch.
- R. UL: Underwriters Laboratories, Inc.
- S. UL Listed: Materials or equipment listed by UL and included in the most recent edition of the UL Fire Protection Equipment Directory or other appropriate UL directory. This listing indicates that periodic inspections of the production of listed equipment or materials are made and that the equipment or materials satisfy UL standards and have been tested and found suitable for use in a specified manner.

#### 1.03 SCOPE OF WORK

- A. Visit the site and determine existing conditions and extent of work. The fire sprinkler contractor shall be responsible for all code research, design coordination and installation of a complete and functional hydraulically calculated sprinkler system and standpipe system, if required, in accordance with NFPA-13, 13R 14, 20 and 72 and FM 2-8N.
- B. Complete Fire Protections System as outlined in these specifications, including all labor, materials and shop drawings needed to furnish and install a complete and functional Automatic Sprinkler System, including all of the following:
1. Connection to flanged outlet, provided by the plumber, in the sprinkler riser room.
  2. Standard 2-1/2 inch by 2-1/2 inch by 4-inch chrome plated fire department connection with check valve and ball drip at outside wall.
  3. Complete and functional wet pipe systems in building with control valves and alarm valves, including trim and local alarm (water motor gong or electric bell).
  4. All trim, fittings, offsets, hangers and accessories, whether shown or not, necessary to provide a complete and functional system.

5. Double check type backflow prevention device when required by local authorities.
6. Fire hose racks complete with hose valves, fire hose and nozzles at the stair landings, if required.
7. Coordination of work with all other trades.
8. Shop drawings, including Drawings, Hydraulic Calculations and Piping Design, sealed by a registered professional engineer, NICET III or IV sprinkler designer as required by the State of Arkansas.
9. Operating instructions and valve diagrams.
10. As built drawings.
11. Waterflow and valve supervisory switches for interlocking with the building fire alarm panel.
12. Flexible couplings.
13. Sleeves.
14. All required system testing.
15. Warranty of all materials and labor.
16. Pay for all permits, fees, state, federal and local taxes, and charges required for this work.
17. Fire pump and jockey pump to meet elevation requirements for five (5) story hotel.

- C. Fire sprinkler specifications are for performance criteria only. Actual piping, routing, head layout, hydraulic calculations and material data sheets shall be the responsibility of the sprinkler contractor.

#### 1.04 RELATED WORK

- A. Related work provided by others:

1. Underground piping terminating at flanged outlet, 1 foot above the finished floor. (By Plumbing Contractor)

2. Painting of sprinkler piping, hangers and valves, including placing and removal of bags or other protection devices on sprinklers to prevent paint from touching any portion of the sprinkler. Painting will be required only in areas where piping system is exposed to public view. Paint color shall be gray to match exposed structure color. ( By General Contractor)
3. Electrical power supply or actuation circuit to water flow switches and valve supervisory switches. (By Electrical Contractor)
4. Trapped floor drain in the main mechanical room. (By Plumbing Contractor)
6. Concrete splash blocks at inspector's test outlet(s) and 2-inch main drain discharge.
7. Freezing protections (heat tracings and insulation) sprinkler piping subject to freezing conditions. Fire sprinkler wet pipe systems shall not be installed in unheated areas such as attics in areas subject to freezing conditions.

#### 1.05 SYSTEM DESCRIPTION

##### A. Sprinkler System Design Criteria:

In accordance with applicable NFPA standards, and the following criteria:

1. Guest Room Units, offices, lobby, seating area, and corridor:
  - a. Light hazard occupancy - This system shall be designed to provide 0.1 GPM per square foot to the most remote 1,500 square foot area with a combined hose demand of 250 GPM at bottom of the riser.
2. Laundry, storage rooms, trash room, mechanical room:
  - a. Ordinary hazard occupancy - This system shall be designed to provide 0.15 GPM per square foot to the most remote 1,500 square foot area with a hose demand of 250 GPM at the nearest available fire hydrant.
3. Sprinkler system pipe sizing shall be determined by hydraulic calculations in accordance with NFPA 13 and as well as the requirements of this specification. Hydraulic calculations should



be based upon a flow test provided by municipal water authority or sprinkler contractor.

B. Hose Station Design Criteria:

1. 1-1/2-inch hose station at each stair landing shall be supplied from the standpipe system, if required.

C. Supplemental Criteria:

All control valves shall be supervised with valve supervisory switches.

1.06 QUALITY ASSURANCE

A. Testing Agency:

All materials shall be UL listed.

B. Regulatory Agencies:

State and local building codes and ordinances, Factory Mutual, fire department and Fire Prevention Bureau requirements, and the requirements of the owner's insurance company shall apply.

C. Reference Standards:

The following standards are included as part of this specification as applicable:

1. National Fire Protection Association (NFPA) as listed:
  - a. NFPA 13, 13R, 13D, 231C, 20, 14, 14A, etc.  
Standard for the Installation of Sprinkler Systems, 1989 Edition.
2. Underwriters Laboratories, Inc. (UL) Publication: Fire Protection Equipment List.
3. State codes.

1.07 SUBMITTALS

A. Shop Drawings:

1. Prepare shop drawings at a minimum scale of 1/8 inch equals 1'-0" for plans, and 1/4 inch equals 1'-0" for details. Show all piping, sprinklers, hangers, type of pipe, tube connections, outlets, flexible couplings, roof construction, and occupancy of each area, including ceiling and roof heights as required by NFPA 13. When welding is planned, shop drawings shall indicate the sections to be shop welded and the type of welded fittings to be used. Shop drawings shall indicate all information required by NFPA 13.
2. Fire Protection System shop drawings shall include separate and complete reflected ceiling plans indicating the location of each sprinkler, as well as piping layouts. Provide additional sprinklers (over code minimum quantities) if requested by the Architect, to obtain symmetrical ceiling layouts.
3. Submit eight blueline prints of complete shop drawings, eight sets of manufacturer's data and eight sets of the hydraulic calculations for review prior to fabrication of materials. The review will include approval by Factory Mutual and authority having jurisdiction.
4. Contractor shall submit complete submittal packages. Partial submittals will be rejected.
5. The Architect will return one set of the submittal to the Sprinkler Contractor, who shall then submit required prints to the Owner for the final review and approval.
6. Review of the shop drawings submittals shall not relieve the Contractor of his responsibility to comply with the contract, plans, specifications, NFPA requirements, and state and local codes.
7. Fire sprinkler contractor shall submit hydraulically calculated system to the local or state Fire Marshal for review and shall not commence fabrication or installation until approval has been received.

B. Manufacturer's Data:

Provide data from manufacturer on the following devices, including installation, maintenance, and testing procedures, dimensions, wiring diagrams, etc.

1. Sprinklers and escutcheons.

2. Pipe, fittings and hangers.
3. Control valves.
4. Alarm check valves.
5. Backflow prevention device.
6. Check valves.
7. Waterflow devices.
8. Valve supervisory devices.
9. Fire hose.
10. Fire hose valves.
11. Fire hose racks.
12. Water alarm.
13. All other system components.

Where any devices which are provided or furnished involve work by another contractor, submit additional data copies directly to that contractor.

C. Record Drawings:

1. Maintain at the site and up-to-date marked set of record drawings which shall be corrected and delivered to the Owner upon completion of the work.
2. Upon completion, furnish the Owner with one reproducible sepia print and one blueline print of each shop drawing, revised to show actual conditions.

D. Test Reports:

Upon completion of final inspections and tests, as required by appropriate NFPA standards, submit copies of Standard Contractor's Material and Test Certificates for both underground and above ground piping.

1.08 DELIVERY, STORAGE AND HANDLING OF MATERIALS

- A. Deliver all materials to area of project designated by the Owner's representative. Vehicles shall not block fire lanes or fire doors during delivery of materials.
- B. Store all materials within area designated by the Owner's Representative. At the end of each working day, return all materials to the designated area. Materials, equipment, tools, etc. will not be left outside the Storage Area without the consent of the Owner's representative.
- C. Assume responsibility for the cost of all material handling, delivery and freight.
- D. Maintain the premises free from accumulation of waste materials or rubbish caused by this work. At the completion of the work, remove all surplus materials, tools, etc., and leave the premises clean to the Owner's satisfaction.

#### 1.09 WARRANTY

- A. This Contractor shall provide a one-year written warranty against defects in material and workmanship furnished under this contract. The costs of such warranty shall be part of the purchase price. The warranty commences when the system and installation are accepted by the Architect.
- B. The warranty shall include all necessary material, travel, labor and parts to replace defective components or materials at the job-site.
- C. Commence repair of any "in guarantee" defects within 18 hours of notification of such defects.
- D. Make allowances in the warranty to cover diagnosis of system defects which might ultimately be the responsibility of others to correct. Notify the Owner and other affected trades when this occurs.
- E. Provide emergency repair service for the Sprinkler System within four hours of a request for such service by the Owner during the warranty period. This service shall be available on a 24-hour per day, seven-day per week basis.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. All materials shall be UL listed and comply with the provisions of NFPA 13.
- B. All components shall be used in accordance with the manufacturer's recommendations and their FM approval and UL listing.
- C. The naming of manufacturers in the specifications shall not be construed as eliminating the materials, products or services of other manufacturers and suppliers providing approved equivalent items.

## 2.02 OVERHEAD PIPING

- A. All pipe shall meet the requirements of NFPA 13 and 13R. Pipe shall be new, designed for 175 psi minimum working pressure, conforming to ASTM specifications, and have the manufacturer's name and brand along with the applicable ASTM standard marked on each length of pipe.

- 1. Steel:

- Steel piping shall be black or galvanized. (Galvanized to be used for dry-type systems).

- a. Piping shall be in accordance with NFPA 13 and 13R.
      - b. Piping shall be Class I, Schedule 40 ASTM A-120 black steel piping for branches and Class I schedule 10 ASTM-120 black steel for mains. Thinwall steel pipe and CPVC plastic allowed only as alternate if approved by local authorities and approved by U.L. Listing.
      - c. Threaded Schedule 10 and light "XL" piping is not permitted.

## 2.03 FITTINGS

- A. Change of direction, unless otherwise noted, shall be accomplished by the use of fittings suitable for use in Sprinkler Systems, as defined in NFPA 13. Fittings exposed to outside atmosphere shall be galvanized. Bushings shall not be used unless written approval is obtained from the Architect. Additional fittings, pipe and hangers required by site conditions shall be provided at no additional cost to the Owner.
- B. Grooved fittings shall be joined using rubber gaskets from the same manufacturer. Gaskets shall be listed for use for the appropriate application (wet or dry system).

## 2.04 SPRINKLERS

- A. Guest Room units, offices, lobby, seating area, meeting rooms and corridors:

Chrome plated recessed 165 degree (F) temperature rated fast response sprinklers with two-piece escutcheons.

- B. Ventilated attics, mechanical rooms, linen storage, laundry, electrical panel closets, trash rooms, and telephone rooms:

1. Areas with ceilings - Chrome plated 212°F fast response heads.
2. Areas with no ceiling - Standard bronze upright type fast response sprinklers, 212 degree (F) temperature rated.

- C. Install intermediate and high temperature sprinklers of proper degree and rating wherever necessary to meet the requirements of NFPA 13 and as follows:

1. 286 degree sprinklers shall be installed as indicated, in unventilated attics.

- D. Large orifice sprinklers shall have 3/4-inch IPT threads.

## 2.05 FIRE HOSES AND VALVES

- A. Hose Stations:

1. Provide hose rack with 100 feet maximum 1-1/2-inch woven jacket neoprene line hose(s) with 1-1/2-inch combination fog and straight stream nozzle at the stair landings.

- B. Hose Threads:

Hose threads for hydrants, hose valves and fire department siamese connection shall match those of the local Fire Department.

## 2.06 ALARM DEVICES

- A. Water flow Devices:

Pressure type water flow switches shall be provided on wet sprinkler systems where indicated. The switches shall be adjustable and shall actuate within 90 seconds after the inspector's test valve is opened.

B. Supervisory Devices:

Valve supervisory devices shall be S.P.D.T. with gasketed rain-tight enclosures. The valve supervisory devices shall be installed to transmit a supervisory signal within the first two turns of the control valve handle.

2.07 OTHER COMPONENTS

A. Signs:

1. Provide standard metal signs in accordance with NFPA 13.
2. Provide hydraulic information signs at risers, in accordance with NFPA 13.

B. Hangers:

1. Inserts, powder driven studs, expansion cases of Phillips-type shells shall be installed to support the 1-inch through 4-inch size sprinkler piping below concrete construction. Inserts shall also be installed for all 5-inch or larger piping below concrete construction. In lieu of the inserts, expansion cases spaced not more than 10 feet apart may be installed in accordance with NFPA 13.
2. Use beam clamps to hang piping from top chord or joist below steel deck and joist construction. Do not hang piping from bottom chord or bridging.

C. Water Alarm:

1. Provide weatherproof water alarm as shown on the drawings.
2. Alarm shall be electric bell or similar means to alarm on exterior of building.

D. Inspectors test - Provide inspectors test assemblies at remote ends of systems and hard pipe discharge by express drains to exterior of building. Do not pipe discharge onto sidewalks or landscaping.

PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. Changes:

1. Make no changes in sprinkler head layout as shown on the drawings. This does not include minor revisions for the purpose of coordination.

#### B. Clean-Up:

1. Maintain the premises free from accumulation of waste materials or rubbish caused by this work.
2. At the completion of the work, remove all surplus materials, tools, etc., and leave the premises clean.

#### C. Overhead Piping:

1. All sprinkler piping, drain and test piping, fire department connection piping, etc., exposed to weather shall be galvanized.
2. All sprinkler piping must be substantially supported from the building structure and only approved type hangers shall be used. Sprinkler lines under ducts shall not be supported from ductwork, but shall be supported from the building structure with trapeze hangers where necessary or from steel angles supporting ductwork in accordance with FM Data Sheet 2-8N and NFPA 13.
3. Sprinklers below ceilings which are on exposed piping shall be listed and approved regular bronze upright type, in upright position, except listed and approved regular bronze pendent type in pendent position which may be used on wet pipe systems where necessary due to clear height requirements, duct interference's, etc.
4. Pendent sprinklers shall be in alignment and parallel to walls, etc.
5. Pendent sprinklers shall be located within a minimum of 4 inches from the ceiling T-bar.
6. Adjustable escutcheons shall not be used.
7. Sprig-ups shall be provided wherever necessary to provide proper deflector distances in accordance with NFPA 13 requirements.



8. Sprinkler piping shall be installed above ceilings.
9. Install sprinkler piping in exposed areas as high as possible using necessary fittings and auxiliary drains to maintain maximum clear head room.
10. Install sprinklers as required by NFPA 13 with regard to ducts, obstructions and partitions.
11. Complete sprinkler installation and place in service during hours when the Owner's facilities are not open to the public or for standard business in all areas where merchandise or fixtures are stored in place.
12. Provide sprinkler protection before combustible contents are moved into the building.
13. Install paired flanges and numbered test blanks to provide partial protection during construction. Maintain a "test blank log", as shown on the drawings, at the site during construction to assure removal of all blanks at the completion of the job.
14. A relief valve not less than 1/2-inch in size, set to operate at a pressure of not greater than 175 psi, should be provided for the gridded wet pipe systems.
15. Install an adequately sized baffle to prevent direct water discharge from the sprinkler located over the high voltage electrical equipment.
16. Provide a control valve in the supply piping to the sprinklers for each floor, the Elevator Machine Room and at the top of the elevator shaft and laundry chute.

D. Adjustment and Cleaning:

1. Adjustment:

Remove all burrs from pipe threads and fittings, and all debris and foreign material from inside all pipe and fittings before installation. Correct all system leaks prior to final acceptance test.

2. Cleaning:

Flush all piping in accordance with NFPA standards for test procedures.

E. Drains:

1. Provide main drain valves at system control valves, sized in accordance with NFPA 13 and extend piping to outside of building.
2. Provide all auxiliary drains where necessary, extended to a safe location.
3. Pipe all drains and auxiliary drains to locations where water drained will not damage stock, equipment, vehicles, planted areas, etc., or injure personnel.
4. Plugs used for auxiliary drains shall be brass.
5. All piping and fittings downstream of drain valve shall be galvanized.
6. High and low pressure drains shall not be connected together.
7. An adequately sized drain should be provided near the riser header. This is a part of the Plumbing Contractor's work.

F. Ceiling and Wall Plates:

Install finished ceiling and wall plates wherever exposed sprinkler piping passes through floors, ceilings and walls.

G. Sleeves:

1. Set sleeves in place for all pipes passing through floor openings.
2. Space between sleeve and pipe shall be filled with noncombustible fire-stopping. Ratings of fire-rated walls shall be maintained. Provide chrome finished wall plates at each side of the wall.

H. Flushing Connections:

Provide flushing connections in cross mains as specified in NFPA 13.

I. Fire Department Connection:

Install fire department connection properly connected to piping with necessary check valve and ball drip drain connection. Provide standard nameplate marked "Automatic Sprinklers".

J. Alarm Valves:

Install alarm check valves on each riser, complete with trim and pressure alarm switch, connected to outside water motor alarm gong, or electric bell.

K. Inside Control Valves:

1. Provide OS&Y gate valves on approved gear operated butterfly valves.
2. Vane for butterfly valve shall be a symmetrical design and so designed that they can be assembled only one way. Always to give the correct indication.
3. Provide control valves on both sides of the check valve in the incoming sprinkler supply piping to facilitate maintenance, repair or removal of the check valve.

### 3.02 WELDING

- A. No field welding of sprinkler piping shall be permitted.
- B. Headers, risers, feed mains, cross mains and branch lines may be shop welded using acceptable welding fittings. Welding and torch cutting shall not be permitted as a means of installing or repairing Sprinkler Systems.
- C. Provide a blind flange or grooved cap and coupling at each end of the welder header.
- D. Certify welders or brazers as being qualified for welding and/or brazing, in accordance with the requirements of NFPA 13.

### 3.03 INSPECTOR'S TEST CONNECTIONS

- A. Provide inspector's test connections, as specified in NFPA 13, at required points for testing each waterflow alarm device. Special discharge nozzle shall have the same size orifice as the smallest orifice sprinklers installed.
- B. Provide a 1-inch sight glass in inspector's test discharge cannot be readily observed while operating valve.

- C. Pipe all inspector's test connections discharging to atmosphere, to a location where water drained will not damage stock, equipment, vehicles, planted areas, etc., or injure personnel.
- D. Splash blocks shall be provided where inspector's test discharge could produce damage to surroundings.
- E. All pipe and fittings downstream of the inspector's test valve shall be galvanized.

#### 3.04 SPRINKLER GUARDS AND WATER SHIELDS

- A. Provide guards on sprinklers within 7 feet of the finished floor or wherever sprinklers may be subject to mechanical damage.
- B. Install sheet metal water shield (5-inch minimum diameter) over each intermediate rack sprinkler or install special listed sprinklers manufactured with integral water shields, as shown on the drawings.

#### 3.05 SPECIALTY DEVICES

- A. Installation of all specialty devices shall be in accordance with the manufacturer's instructions. Where the installation of those devices require use of a torque wrench or other appliance, the Contractor shall certify that manufacturer's instructions have been complied with.

#### 3.06 FIELD QUALITY CONTROL

- A. Installer shall be responsible for all tests required during the course of installation. Testing of the completed system shall be done in the presence of a representative of the Marriott Fire Protection Department, local code authority, Factory Mutual representative and Professional of record.
- B. The Contractor shall make arrangements with the Owner and Engineer for final inspection.
- C. When the Architect visits the jobsite for final inspection, after being advised by the Contractor that the work is complete and ready for inspection, if the work has not been completed, the Contractor shall be responsible for the Architect's extra time and expenses for reinspection and witnessing the retesting of the work. Such extra fees shall be deducted from payments by the Owner to the Contractor.

D. The Contractor shall provide at least two working days written notice prior to all flushing and hydrostatic tests.

E. Testing Overhead Piping:

Test all overhead sprinkler piping for a period of two hours, in accordance with NFPA 13. All piping, valves, sprinklers, etc. shall be watertight. Test dry pipe systems at an air pressure of 40 psi for 24 hours. Notify the Architect 48 hours in advance regarding the time and date of all tests.

### 3.07 PROTECTION

A. Damage:

Protect all unfinished work to prevent damage and furnish protection of all surrounding areas where necessary.

B. Leak Damage:

The Contractor shall be responsible during the installation and testing periods of the Sprinkler System for any damage to the work of others, to the building or its contents caused by leaks in any equipment, by unplugged or disconnected pipes or fittings, or by overflow, and shall pay for the necessary replacements or repairs to work of others damaged by such leakage.

C. Water shall not be introduced into the system during conditions where there is danger of freezing.

### 3.08 OPERATING INSTRUCTIONS

A. At the completion of the work, provide a small scale plan of each Sprinkler System indicating the locations of all control valves, low point drains, and inspector's test valves. The plans shall be neatly drawn and color coded to indicate the portion of the building protected by each system, framed under glass and permanently mounted on the wall adjacent to the header.

B. Provide two copies of NFPA 13-A and bound set(s) of printed operating and maintenance instructions to the Architect, and adequately instruct the Owner's Maintenance Personnel in proper operation and test procedures of all fire protection components provided, furnished, or installed.

C. Conduct two training sessions of four hours each to familiarize the Building Personnel with the features, operation and maintenance of the

Sprinkler Systems. Schedule training sessions at a mutually agreeable time to the Contractor and the Owner.

### 3.09 SPARE PARTS

- A. Provide spare sprinkler cabinets, complete with not less than 24 sprinklers of assorted temperature ratings of the type necessary and in use throughout the installation. Each cabinet shall be equipped with twelve sprinklers and one special sprinkler wrench required for each type of sprinkler installed.
- B. Install sprinkler cabinet in the Riser Area.
- C. Confer with the Architect for exact location of cabinet.

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EOS

## SECTION 15170 - MOTOR STARTERS AND CONTROLS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide motor starting equipment necessary to automatically start and stop electric motors furnished as part of Division 15 - Mechanical.
- B. Provide push-buttons, hand-off-auto switches, pilot lights, interlock contacts, overload heaters, motor starter enclosures and proper holding coils for control of motor starters and related equipment.

#### 1.02 RELATED WORK

- A. Electrical power wiring and motor control centers - Division 16.
- B. Section 15800 - Temperature Controls Basic Materials and Methods.
- C. General - Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

#### 1.03 QUALITY ASSURANCE

- A. Manufacturer comply with NEC, UL, NFPA, IEEE Standard 241 and NEMA.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030. Submit manufacturers literature showing starter size, coil voltage, auxiliary contacts, enclosure type and specific equipment to be used with.

### PART 2 - PRODUCTS

#### 2.01 MOTOR STARTERS

- A. Provide motor starters equal to Cutler-Hammer, Square-D, Allen Bradley, Siemens or General Electric.
- B. Provide across-the-line or combination starter/disconnects, full voltage A-C current motor starters for controlling three phase motors. Provide NEMA 1 enclosure unless specified or indicated otherwise. Provide hand-off-auto switch, overload reset, green running light, and one (1) spare set of auxiliary contacts.

Furnish proper holding coil for use with control system requirements, 3 overload heaters sized for full load amps of motor to be controlled. Starters equal to Cutler-Hammer Series A-10.

- C. Provide manual starters for single phase motors with quick-make, quick-break toggle switch, green pilot light, thermal overload, and padlock connection. Starters equal to Cutler-Hammer 9101H111, suitable for flush mounting.

## 2.02 REMOTE PILOT DEVICES

- A. Push-button stations shall be Cutler-Hammer Series E10 with NEMA 1 enclosures and pilot light.
- B. Hand-off-auto switches shall be Cutler-Hammer Series E20, Category 10250T21KB mounted in NEMA 1 enclosure with pilot light.

## PART 3 - EXECUTION

### 3.01 INSTALLATION AND MOTOR STARTERS

- A. Install motor starters as indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices; complying with applicable requirements of NEC, UL and NEMA standards, to insure that products fulfill requirements.
- B. Coordinate with other work including motor and electrical wiring/cabling work, as necessary to interface installation of motor starters with other work.
- C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.
- D. Subsequent to connecting wires/cable, energize motor starter circuitry and demonstrate functioning of equipment in accordance with requirements; where necessary correct malfunctioning units, and then retest to demonstrate compliance. Ensure that direction of rotation of each motor fulfills requirements.

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EOS



## SECTION 15190 - MECHANICAL IDENTIFICATION

### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. Extent of mechanical work required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of identification devices specified in this section include painted identification materials, plastic pipe markers, plastic tape, underground-type plastic line marker, valve tags, valve schedule frames, engraved plastic-laminate signs, and plasticized tags.

#### 1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Mechanical identification furnished as part of factory-fabricated equipment, is specified as part of the equipment assembly in other Division 15 sections.

#### 1.03 QUALITY ASSURANCE

- A. Comply with ANSI Standards A13.1 for lettering size, colors, and viewing angles of identification devices.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030.
- B. Product Data: Submit product specifications and installation instruction for each identification material and device required.
- C. Maintenance Materials: Furnish minimum of 5% extra stock of each mechanical identification material required, including additional numbered valve tags (not less than 3) for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes. Where stenciled markers are provided, clean and retain stencils after completion of stenciling and include used stencils in maintenance materials, along with required stock of stenciling paints and applicators.

## PART 2 - PRODUCTS

### 2.01 MECHANICAL IDENTIFICATION MATERIALS

- A. Provide manufacturer's standard products of categories and types required for each application as referenced in other Division 15 sections. Where more than single type is specified for application, selection is installer's option, but provide single selection for each product category. W. H. Brady Company, Signmark Div. or Seton Name Plate Corporation.
- B. Painted Identification Materials:
  - 1. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-1/4" high letters for ductwork, and not less than 3/4" high letters for access door signs and similar operations instructions.
  - 2. Stencils Paint: Standard exterior type stenciling enamel, black except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
  - 3. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ANSI A13.1 for colors.
- C. Plastic Pipe Markers: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent, color-coded, plastic-sheet pipe markers, complying with ANSI A13.1.
  - 1. Small Pipes: For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location, fastened by one of the following methods:
    - Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
    - Adhesive lap joint in pipe marker overlap.
    - Laminated or bonded application of pipe marker to pipe (or insulation).
    - Taped to pipe (or insulation with color-coded plastic adhesive tape, not less than 3/4" wide; full circle at both ends of pipe marker, tape lapped 1-1/2".

2. Large Pipes: For external diameters of 6" and larger (including insulation of any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter heights (and of required length), fastened by one of the following methods:

Laminated or bonded application of pipe marker to pipe (or insulation).

Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 1-1/2" wide; full circle at both ends of pipe marker, tape lapped 3".

3. Comply with piping system nomenclature as specified, scheduled or shown, and abbreviate only as necessary for each application length. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

D. Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service buried pipe.

E. Valve Tags:

1. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. Provide 1-1/2" diameter tags, except as otherwise indicated. Provide size and shape as specified or scheduled for each piping system.
2. Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in 1/4" high letters and sequenced valve numbers 1/2" high, and with 5/32" hole for fastener. Provide 1-1/2" sq. black tags with white lettering, except as otherwise indicated. Provide size, shape, and color combination as specified or scheduled for each piping system.
3. Plastic Valve Tags: Provide manufacturer's standard solid plastic valve tags with printed enamel lettering, with piping system abbreviation in approximately 3/16" high letters and sequenced valve numbers approximately 3/8", and with 5/32" hole for fastener. Provide 1-1/8" sq. white tags with black lettering.
4. Valve Tag Fasteners: Manufacturer's standard solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper

attachment of tags to valves, and manufactured specifically for that purpose.

- F. Valve Schedule Frames: For each page of the valve schedule, provide a glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.
- G. Access Panel Markers: Provide manufacturer's standard 1/16" thick engraved plastic laminated access panel markers, with abbreviations and numbers corresponding to concealed valve. Include 1/8" center hole to allow attachment.
- H. Engraved Plastic-Laminate Signs: Provide engraving stock melamine plastic laminate in the sizes indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
  - 1. 1/8" thick, except as otherwise indicated.
  - 2. Fasteners: Contact-type permanent adhesive.
- I. Plastic Equipment Markers: Provide manufacturer's standard laminated plastic, equipment markers, 4-1/2" x 6" size, white letter on red background.
- J. Plasticized Tags: Manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, or plasticized card stock with matt finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording (as examples; DANGER, CAUTION, DO NOT OPERATE).

### PART 3 - EXECUTION

#### 3.01 APPLICATION AND INSTALLATION

- A. General Installation Requirements: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- B. Piping System Identification: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

1. Stenciled markers, including color-coded background band or rectangle, and contrasting lettering of black or white. Extend color band or rectangle 2" beyond ends of lettering.
  2. Plastic pipe markers, with application system as indicated under "Materials" in this section.
  3. Stenciled markers, black or white for best contrast, wherever continuous color-coded painting of piping is provided.
- C. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, mechanical rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
1. Near each valve and control device.
  2. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.
  3. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.
  4. At access doors, manholes and similar access points which permit view of concealed piping.
  5. Near major equipment items and other points of origination and termination.
  6. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.
  7. On piping above removable acoustical ceilings, except omit intermediately spaced markers.
- D. Underground Piping Identification: During backfilling/top-soiling of each exterior underground piping systems, install continuous underground-type plastic line marker, located directly over buried line at 6" to 8" below finished grade. Where multiple small lines are buried in common trench and do not exceed overall width of 16", install single line marker. Install copper tracer wire on all non-metallic underground piping, wire to be #14 gauge THW strapped to pipe at 20' intervals.

- E. Valve Identification: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for piping system.
1. Mount valve schedule frames and schedules in machine rooms where indicated or, if not otherwise indicated, where directed by architect/engineer.
- F. Mechanical Equipment Identification: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operation devices:
1. Compressors, condensers, and similar motor-driven unit.
  2. Fans, blowers, primary balancing dampers, fire and smoke dampers.
  3. Packaged HVAC central-station and zone-type units.
  4. Water heaters.

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EOS

## SECTION 15250 - MECHANICAL INSULATION

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Piping System Insulation: Domestic water, refrigerant suction lines, condensate drains, horizontal runs of roof drain piping and roof drain bodies.
- B. Ductwork System Insulation.

#### 1.02 QUALITY ASSURANCE

- A. Installer: A firm with successful installation experience on projects with mechanical insulation's similar to that required for this project.
- B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread rating of 25 or less, and smoke-developed rating of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
- C. Insulation materials placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E84. All such materials shall meet the requirements of noncombustible building materials as defined by the Standard Building Code or the material shall be enclosed within a fire resistant assembly meeting the noncombustible requirements.

#### 1.03 SUBMITTALS

- A. Comply with Section 15030.
- B. Product Data: Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.
- C. Certifications: Submit manufacturer's certifications to show compliance with these specifications and governing regulations. Include proof of compliance for test of products for fire rating, corrosiveness, and compressive strength.

#### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label affixed showing fire hazard ratings of products.
- B. Protect insulation against dirt, water, chemical or mechanical damage. Do not install damaged insulation.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Armstrong World Industries, Inc., Certaineed Corporation, Johns-Manville Corporation, Owens-Corning Fiberglass Corporation, or Pittsburg Corning Corporation.

### 2.02 PLUMBING PIPING SYSTEM INSULATION

- A. Insulation Omitted.

- A. Insulation Omitted.

- 1. Omit insulation on chrome-plated exposed piping (except for handicapped fixtures ), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawlspaces or tunnels and pre-insulated equipment.

- B. Cold Piping: Insulate domestic cold water piping in corridors and mechanical rooms with ½" fiberglass. Insulate roof drain horizontal piping and roof drain bodies with ½" fiberglass.

- C. Hot Piping: Insulate domestic hot water and hot water re-circulating piping in corridors and mechanical rooms with 1" thick fiberglass for pipe sizes up to and including 2", 1-1/2" thick for pipe sizes 2-1/2" and larger, and hot drain piping on exposed handicapped sinks.

### 2.03 HVAC PIPING SYSTEM INSULATION

- A. Cold Piping (40 degrees F to ambient):

- 1. Condensate drains: Insulate air conditioning condensate drain piping with ½" fiberglass pipe covering with vapor barrier or ½" flexible unicellular insulation.



2. Refrigerant suction lines: Insulate with 1/2" thick flexible unicellular (Armaflex) insulation with mastic joints for pipe sizes 1" and smaller and 1-1/2" for larger pipe sizes..

#### 2.04 DUCTWORK INSULATION (EXTERNAL)

- A. Insulate all rectangular and round ductwork externally with 1-1/2" thick flexible fiberglass with vapor barrier having minimum R-Value of 5.0.. (See Division 15700).
- B. Insulate all exposed metal surfaces subject to condensation such as ceiling air diffusers, sidewall register plenums, etc.

### PART 3 - EXECUTION

#### 3.01 GENERAL

- A. Insulation materials shall not be applied until all systems tests have been satisfactorily completed and surfaces to be insulated have been cleaned and dried. Insulation shall be clean and dry when installed and during the application of any finish. Install materials neatly with smooth and even surfaces with jackets drawn tight and smoothly cemented down on longitudinal and end laps. Scrap pieces shall not be used where a full-length section will fit. Pipe insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems. Piping and ductwork shall be individually insulated. A complete moisture and vapor seal shall be provided wherever insulation terminates against metal hangers, anchors and other projections through insulation on surfaces for which a vapor seal is specified. Chrome plated pipes shall not be insulated. Omit insulation from vibration isolating connections, but adjacent insulation shall be neatly terminated and beveled and sealed. Fan nameplates, access plates in fan housings and ducts must be carefully beveled and sealed around.

#### 3.02 PIPE INSULATION

- A. Fiberglass:

Sections of insulation shall be placed around the pipe tightly butted into place. The jacket laps shall be drawn tight and smooth and secured with a factory applied self sealing lap. Circumferential joints shall be covered with butt strips, not less than 3" wide, of material identical to the jacket material. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. When a vapor barrier is required, seams shall be sealed with a brush coat of fire resistant vapor barrier coating, applied at all longitudinal and circumferential laps. End of sections of insulation that butt against flanges, unions, valves, and fittings, and joints at intervals of not more than 12 feet on continuous runs of pipe shall be coated with a vapor barrier coating. Breaks and punctures in the jacket material

shall be patched by wrapping a strip of jacket material around the pipe and cementing, coating as specified for butt strips. The patch shall extend not less than 1-1/2" past the break in both directions. At penetrations such as thermometers, the voids in the insulation shall be filled with vapor barrier coating and the penetration sealed with a brush coat of the same coating. Insulation shall be additionally secured on 18" centers with 1/2" wide aluminum bands.

B. Flexible Unicellular Insulation:

Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90 degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral fiber or calcium silicate insulation inserts and sheet metal sleeves.

1. Apply two coats of manufacturer's approved exterior sealer finish to flexible unicellular insulation in outside locations.
2. Insulate flanges, valve bodies, and fittings in accordance with manufacturer's published instructions.

C. Urethane insulation:

Apply urethane insulation to underground piping in same manner as fiberglass. Additionally, wrap insulation with 20 mil PVC jacket, solvent weld all seams and joints.

### 3.03 DUCTS, PLENUMS AND CASINGS INSULATION

- A. Rigid Insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3" from edge of boards and spaced not more than 15" on centers and secured with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Apply insulation with joints tightly butted. Neatly bevel insulation around nameplates and access plates and load. Protruding ends of pins shall be cut off flush after clips are secured and sealed with coating compound.
- B. Flexible Blanket Insulation: Apply insulation with all joints tightly butted. Insulation on the sides and bottoms of rectangular, horizontal, and sloping ducts shall be secured to ducts by impaling over anchor pins located not more than 3" from the edge and spaced not more than 15" on centers, secured with washers and clips. Anchor pins shall be spot welded or attached with a waterproof adhesive especially designed for use on metal surfaces. Sagging of flexible duct insulation will not be permitted. Protruding ends of pins shall be cut off flush after clips are secured and sealed with coating compound. Stapled seams shall be rotated such that seams are not exposed to view. Provide aluminum tape, minimum 2" wide, at all seams and joints.

- C. Insulation Finishes: A skilled mechanic will cut and fit all fittings with flexible insulation for a neat appearance and full coverage with a minimum of unnecessary overlaps. All breaks, punctures, and voids on exposed insulation shall be filled with vapor barrier metal tape. All joints shall be vapor barrier sealed by applying an approved pressure sensitive aluminum tape. All longitudinal and circumferential seams shall be sealed.
- D. Access Plates and Doors: On acoustically lined ducts, plenums, and casings, bevel insulation around access plates and doors. Seal exposed insulation at beveled cuts with approved material. On externally insulated ducts, plenums, and casings, provide insulation filled hollow steel panels and doors for access openings.
- E. Lined Ductwork: Except as otherwise indicated, omit insulation on ductwork where internally insulated or on cooling terminal units with 1" fiberglass or more internal sound absorbing linings. Refer to "Low Pressure Ductwork" (Division 15700).
- F. Ductwork Exposed to Weather: Protect outdoor insulation from weather by installing outdoor protective finish aluminum jacketing as recommended by manufacturer, or as indicated on drawings.

#### 3.04 PROTECTION AND REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation installer shall advise contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.
- C. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, galvanized sheet metal shields or saddles shall be provided. Where shields are used on pipes 2" and larger, insulation inserts shall be provided at points of hangers and supports. Insulation inserts shall be of cellular glass (minimum 8 pcf), molded mineral fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation with vapor barrier coating. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.

At contractors discretion, delete requirements for insulation inserts and shields on pipe hangers 2" and smaller. Install piping directly on hanger and cut insulation to fit around hangers and seal all insulation breaks with mastic.

- D. Sleeves and Wall Chases: Where penetrating interior walls, extend a 24 gauge metal overlapping jacket 3" out on either side of the wall and secure on each end with a metal band. Where penetrating floors, extend a metal jacket from a point below the riser clamp, if applicable, to a point 4" below the floor with one band below at the ceiling and one not more than one inch from end of metal jacket. Seal between metal jacket and galvanized sleeve at floor and wall penetrations with approved fire stop sealant. Vapor seal all insulation and jackets within sleeve similar to that of adjoining insulation.
- E. Flanges, Unions, Valves and Fittings (Except Flexible Unicellular): When segments of insulation are used, provide elbows with not less than three segments. For other fittings and valves, cut segments to required curvature, or use nesting size section insulation. Place and join the segments of the insulation adhesive. After the segments are in place, vapor barrier coating as applicable. Where larger valves are to be insulated, utilize removable sections, terminate the covering neatly at the ends with insulation cement trowled on a bevel. Apply a vapor barrier coating, as applicable, to the beveled ends. Cover flanged valve bonnets with removable sections of insulation vapor barrier sealed inside and out with adjacent insulation ends neatly finished and vapor barrier sealed.
1. Fitting and Valve Insulation Vapor Barrier: Outer surfaces of the insulation shall be vapor sealed as follows:

A minimum wet film thickness of 1/16" coating of vapor barrier compound shall be applied. A single layer of open weave glass fabric 20" x 20" mesh shall be embedded into the wet coat. The fabric shall be drawn smooth and tight with a 2" overlap at all joints. When the first coat is dry, a final coat of vapor barrier compound of 1/16" minimum wet film thickness shall be applied. For temperatures above 35 degrees F, one piece pre-molded fittings and valve covers made of polyvinyl chloride (PVC) with cellular glass precut insulation inserts may be used. Covers shall overlap adjoining pipe covering and vapor barrier jackets.

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EOS

## SECTION 15500 - ROOFTOP AIR CONDITIONING UNITS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide rooftop air conditioning units with capacities and quantities as shown on drawings and in accordance with ARI Standard 360-81. This section includes rooftop units with , electric heat, and or manual outdoor air as scheduled.

#### 1.02 RELATED WORK

- A. General - Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.
- B. Power wiring to rooftop units to be provided under Division 16.
- C. Section 15700 - Sheet Metal Ductwork  
Section 15900 - Testing, Adjusting and Balancing

#### 1.03 QUALITY ASSURANCE

- A. Comply with ARI 360, NEC, National Roofing Contractors Association and ASHRAE.

#### 1.04 SUBMITTALS

- A. Comply with requirements of Section 15030. Data shall include capacity ratings, electrical requirements, weight, installation instruction and plan mark number for each unit shown.

### PART 2 - PRODUCTS

#### 2.01 ROOFTOP UNITS (RTU)

- A. General

Rooftop units shall be Trane, Carrier or approved equal.

All units shall be factory assembled and tested, piped, internally wired and fully charged with R-22. Cooling capacities shall be rated in accordance with ARI Standard 360. All electrical wiring shall be in accordance with National Electric Code. All units suitable for outdoor rooftop or ground level installation.

All exterior surfaces shall be phosphatized, zinc-coated steel (1.25 ounce per square foot minimum), with enamel finish. Screws shall be coated with zinc-plus-zinc chromate and with neoprene washers where sealing shall be required. Doors shall provide access to control components, filters, outside/return air dampers, evaporator coil, and supply and exhaust fan sections. All access doors and removable panels shall have neoprene gaskets and 1/2", dual density fiber insulation. Roof assembly shall have modified lock seam joints filled with sealant. Drain hole(s) shall be provided on each side of the condenser section. Unit base shall be one-piece welded assembly with 14-gauge formed, load bearing members and overhang to facilitate water run-off. Unit lifting lugs accept chains or cables for rigging. Lifting lugs can also serve as unit tie-down points.

B. Roof Curb

The curb shall be constructed of 16-gauge, zinc-clad steel. The roof curb is designed to mate with unit and provide support and complete weathertight installation when properly installed. Wood nailer strip shall be factory installed, with gasketing provided to seal supply/return air openings. Design shall allow for connection of ductwork to curb prior to setting of unit. Curb shall be 14 inches high and approved by the National Roofing Contractors Association. Roof curb ships knocked down for easy field assembly.

C. Refrigeration System

Refrigeration controls shall include condenser fan, evaporator fan, compressor contactors, and a 24 volt transformer. Each circuit of the unit shall have a separate set of refrigeration controls.

Evaporator coil shall have heavy duty aluminum fins mechanically bonded to 1/2" seamless copper tubing and shall be standard. Factory pressure and leak tested at 300 psi. Expansion valves shall be standard.

Condenser coils shall have aluminum fin surface mechanically bonded to 3/8" OD seamless copper tubing. Factory pressure and leak tested at 425 psi.

Indoor air fan shall be two, double inlet, belt driven, forward curved, centrifugal type fans mounted on a common shaft with adjustable sheave drive. All fans statically and dynamically balanced and tested at the factory. Supply fan shall be run tested in the unit as part of unit run test. Unit reaches its rated rpm before the fan shaft passes through the first critical speed. Fan shaft shall be mounted on two self aligning, permanently sealed ball bearing.

Condenser fans and motors shall have vertical discharge, balanced, direct drive fans mounted in full length, bell mouth orifices. Fan motor shall be three phase with permanently lubricated ball bearings and built in thermal overload protection. Motors shall be line voltage, three phase and shall be equipped with rain shields to eliminate moisture.

D. Electric Heat

Electric heat models shall have completely assembled and wired electric heating system integral within the unit. Electrical heat elements shall be constructed of heavy duty nickel chromium material. Electric heating units shall have multiple banks of electric heating elements with an automatic reset high limit control. High limit protection for the entire heating section shall be provided though completely independent and separate backup contactors and manual reset high limit control. Electric heating section designed for single source electrical service with the refrigeration control circuit.

E. Filters shall be factory installed 2" Farr 30/30 and easily accessible.

F. Manual outside air shall have damper suitable for drawing in up to 25 percent outside air. Control of the damper shall be by manual adjustment at the unit.

G. Low ambient operation field installed damper shall allow compressor operation for cooling down to 40 degrees F. outside air temperature.

H. Disconnect Switches

The Electrical Contractor shall furnish weatherproof disconnect switches for each rooftop air conditioning unit. Mechanical Contractor to install disconnects on A/C units as shown on the drawings with final wiring connection by the Electrical Contractor. Exact location of disconnect by unit manufacturer/installer will not interfere with any panel removal unit operations.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

A. Units to be installed level on factory curbs built for roof pitch.

B. Units shall be structurally supported as shown on plans. The roof design is for the units scheduled on the plans. Any proposed alternative units shall include cost of any additional support which may be required to accommodate the alternate units. Detailed drawings shall be submitted showing structural, duct, electrical and piping changes required for alternate units.

- C. Roof curbs shall be installed in conjunction with roof installation. Coordinate with roofing contractor.

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EOS



## SECTION 15510 - SPLIT SYSTEM AIR CONDITIONING UNITS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide split system air conditioning units of capacities and quantities indicated including air cooled condensers, direct expansion evaporator coils, air units, heating sections and filters.

#### 1.02 RELATED WORK

- A. Section 15070 - Piping Schedule.  
Section 15060 - Pipe, Fittings and Joining Procedures.
- B. General - Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

#### 1.03 QUALITY ASSURANCE

- A. Comply with UL, NEC, AGA, ASME AND NEMA requirements.
- B. Acceptable manufacturers - Trane, McQuay, Rheem, Bryant.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030. Submit manufacturer's literature showing capacity, physical dimensions, electrical requirements, sound ratings, weight, plan mark number and location of each unit scheduled.

### PART 2 - PRODUCTS

#### 2.01 CONDENSING UNITS (CU)

- A. Units 1-1/2 through 10 tons shall be equal to Trane TTA air cooled condensers with single compressors and refrigeration circuits, minimum EER=10.0.
- B. All units to be waterproof with hermetic compressors, condenser coils, fans, motors and holding charge of R-22. Units shall have removable access covers for controls, compressors and service valves. Unless otherwise noted, all units to have low ambient control to 40 degrees F. and 5 year compressor parts warranty.

#### 2.02 EVAPORATOR COILS

- A. Evaporator coils shall be matched with appropriate condensing units to provide cooling capacity scheduled. Coils shall be equipped with thermal expansion valves factory installed, shipped with holding charge of R-22 and coil casing assembly. All units to have insulated drain pan with condensate drain connection.

## 2.03 ELECTRIC FAN COIL AIR HANDLERS (AHU)

- A. Units 1-1/2 through 10 tons shall be equal to Trane Model TWE.
- B. Air handling units shall be factory assembled with blower motors, contactors and controls mounted. Insulated casings shall be provided with filter racks and filters, discharge connection ready for duct connections.
- C. Electric heat coils to be slide-in modules with circuit breakers.
- D. Provide thermostat Honeywell T874 with Q874 sub-base, locking cover.
- E. Provide micro float switch in drain pan and wire to shut down unit in event of condensate stoppage.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF CONDENSING UNITS

- A. Units to be installed on concrete pads or other structural support as shown on drawings. Provide clearance for maintenance and removal of compressors, motors, etc.
- B. Install in manner to prevent condenser discharge air from recirculating to condenser inlet.

### 3.02 INSTALLATION OF AIR HANDLING UNITS

- A. Units to be installed on housekeeping pads, return air platforms or other structural support as shown on drawings. Provide clearance for maintenance of all motors, controls, and coils.
- B. Pipe condensate drains to hub drain, floor drain or other drain provided.

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EOS

## 15520 - THRU-WALL PTAC UNITS

### PART 1 - GENERAL

#### 1.10 SCOPE

- A. Provide thru-wall PTAC units with auxiliary electric heat as scheduled and shown on drawings.

#### 1.02 RELATED DOCUMENTS

- A. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.
- B. 15900 - Testing, Adjusting and Balancing

#### 1.03 SUBMITTALS

- A. Submittals shall comply with requirements of Section 15030. Data shall include dimension drawings, capacity, and electrical requirements.

### PART 2 - PRODUCTS

#### 2.01 THRU-WALL PTAC UNITS (TW)

- A. Trane or General Electric packaged thru-wall units shall be provided as shown on the plans. Units to be complete with four-way adjustable discharge grilles sub-base, remote escutcheon kit, architectural outdoor grille, insulated steel wall sleeve, internal condensate kit, remote thermostat, removable front panel, cabinet made of 18 gauge furniture steel, phosphatized and finished in enamel paint. (Color to be selected by architect). Unit shall have 2 speed blower, built-in electric heat change-over and automatic fresh air damper.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install units in outside wall as shown on plans and details.
- B. Provide wall sleeves to brick mason or general contractor for installation in wall as it is constructed. Caulk around wall sleeve with G. E. silicone caulk after installation for air tight seal.

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## 15550 - ELECTRIC HEATING EQUIPMENT

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. This section includes specifications for electric unit heaters, wall heaters and baseboard heaters.
- B. Electric heating equipment shall be of size and quantities scheduled on drawings.

#### 1.02 RELATED WORK

- A. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.
- B. Power wiring to electric heaters to be provided under Division 16.

#### 1.03 QUALITY ASSURANCE

- A. Comply with NFPA 90A, NEMA, UL, and SMACNA requirements for manufacture and installation.
- B. Acceptable Manufacturers - Qmark, Federal Pacific, Markel, Nuton, Trane, Tutco, Indeco, Brasch.

#### 1.04 SUBMITTALS

- A. Submittals shall comply with requirements of Section 15030. Data shall include capacity ratings, finish, electrical requirements and installation instructions for each item required.

### PART 2 - PRODUCTS

#### 2.01 ELECTRIC UNIT HEATER (EUH)

- A. Heater shall be Q-MARK MUH.
- B. Heater shall have surface mount kit, integral disconnect switch, thermal overloads.

#### 2.02 ELECTRIC WALL HEATER (EWH)

- A. Heater shall be QMARK AWH w/integral disconnect switch, thermostat, surface mount kit.

## 2.03 ELECTRIC BASE BOARD HEATERS

- A. Heaters shall be Q-MARK – 2504 –W rated 1000 watts at 208 volts, single phase.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install heating terminal units as indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that heating terminal equipment fulfills requirements. Comply with applicable installation requirements of NEC and NECA's "Standard of Installation".
- B. Coordinate with other electrical work, including wiring/cabling work, as necessary to properly interface installation of heating terminal units with other work. Clean dust and debris from each heating terminal as it is installed to ensure cleanliness. Comb out damaged fins where bent or crushed before covering elements with enclosures. Touch-up scratched or marred heating terminal enclosure surfaces to match original finishes.

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EOS

## 15650 - EXHAUST FANS AND GRAVITY VENTILATORS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide exhaust fans as scheduled.

#### 1.02 RELATED DOCUMENTS

- A. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.
- B. Section 15700 - Sheet Metal Ductwork  
Section 15900 - Testing, Adjusting and Balancing

#### 1.03 SUBMITTALS

- A. Submittals shall comply with requirements of Section 15030. Data shall include dimension drawings, unit weight, capacity, electrical requirements, sound ratings and curb information.

### PART 2 - PRODUCTS

#### 2.01 GUEST ROOM TOILET EXHAUST FAN (EF) COMMON AREA TOILET FANS (EF)

- A. Provide centrifugal ceiling recessed exhaust fan equal to Greenheck Model SP. Furnish with mounting slots, heavy gage metal housing, unit mounted motor with pre-lubricated bearings and thermal overloads, disconnect switch and integral ceiling grille.
- B. Provide 4" diameter exhaust duct riser to roof mounted booster fan..
- C. Switch with toilet room lights.

#### 2.02 CENTRIFUGAL ROOF MOUNTED EXHAUST FANS (EF)

- A. Provide roof type, curb mounted power ventilators as scheduled on drawings, complete with aluminum housing, totally enclosed motor, factory installed disconnect switch, motor thermal overloads, bird screens, gravity back draft damper and roof curb.
- B. Units to belt driven or direct driven per schedule.

- C. Fan shall be Loren Cook or Greeheck.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install exhaust fans in accordance with manufacturer's recommendations.

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EOS

## 15700 - SHEET METAL DUCTWORK

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide sheet metal ductwork for heating, ventilation, and air conditioning systems as indicated on drawings.
- B. Provide flue gas venting for gas fired equipment as indicated on drawings.
- C. External duct insulation, insulation of breechings or chimneys are included in Section 15250 - not a part of this section.

#### 1.02 RELATED WORK

- A. The following sections contain work related to this section:
  - 15250 - Mechanical Insulation
  - 15710 - Ductwork Accessories
  - 15900 - Testing, Adjusting and Balancing
- B. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

#### 1.03 QUALITY ASSURANCE

- A. Comply with SMACNA Standards for "HVAC Duct Construction Standards, 1985".
- B. Comply with ASTM, AMCA and NFPA Standards.

### PART 2 - PRODUCTS

#### 2.01 DUCTWORK - LOW PRESSURE/MEDIUM PRESSURE

- A. Provide ductwork fabricated from galvanized sheet steel complying with ASTM A 527, lock forming quality and ASTM A 525 galvanized G90 zinc coating for all supply, return, exhaust, outside air, transfer, relief, combustion relief and other ducts for HVAC system.
- B. Provide 22 gauge galvanized round duct for carbon monoxide removal system.



- C. Ductwork, duct insulation and other components of air conditioning ductwork systems placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall meet all standards of Class I duct materials as defined by UL181 and shall have a flamespread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E84. All such materials shall meet the requirements of noncombustible building materials as defined by the Standard Building Code or the material shall be enclosed within a fire resistant assembly meeting the noncombustible requirements.
- D. Provide flexible ducts as indicated on drawings and specified in Section 15710.

## 2.02 DUCTWORK INSULATION – EXTERNALLY

- A. Ductwork shall be insulated with 1-1/2" thick foil faced duct wrap. RE: 15250 – Internal duct liner is not allowed.

## 2.03 DUCT FITTINGS (SUPPLY/RETURN HVAC)

- A. Radius elbows shall be provided with the center-line radius 1-1/2 times the cross sectional dimension of the duct in the plane of the turn. Mitered elbows or square throat elbows with turning vanes will be allowed only where space is limited and must be approved by the engineer.
- B. Branch connections of rectangular ducts to rectangular trunk ducts shall be 45 degrees entry type as shown in detail on drawings. Provide volume dampers in branch ducts. Ninety degree taps will be allowed only where space is limited and must be approved by the engineer and must be provided with air extractors.
- C. Branch connections or outlet tap connections of round duct to rectangular duct shall be made with flanged and gasketed leak-proof air scoops equal to Rainaire.
- D. Parallel flow branches shall be radius type fittings with flow branch radius center-line dimension equal to 1-1/2 times the branch duct in the plane of the turn as shown on drawings.

## 2.04 DUCT FITTINGS (EXHAUST, OUTSIDE AIR, TRANSFER, RELIEF, COMBUSTION AIR, COMBUSTION RELIEF AND OTHER DUCTS)

- A. Standard mitered elbows, 90 degrees taps of trunk ducts by branch ducts for branch connections acceptable.

## 2.05 DUCT HANGERS

- A. Rectangular ducts with largest outside dimension less than 60" shall be supported with galvanized metal strap hangers spaced on 8' centers. Sizes to be as scheduled in Table 4-1 of SMACNA Standards.
- B. Rectangular ducts with largest dimension 60" or greater shall be supported with galvanized steel angle iron trapeze hangers and galvanized all-thread rods. Sizes shall be as scheduled in Table 4-3 of SMACNA Standards.
- C. Round ducts shall be supported using galvanized strap hangers as scheduled in Table 4-2 of SMACNA Standards.

## 2.06 DUCT SEALANT

- A. Provide elastomeric joint sealing compound with maximum flame spread of 25 and maximum smoke developed of 50. Product shall be specifically designated for sealing ductwork systems by manufacturer and shall be Hardcast Iron Grip Sealant, no substitute.
- B. Foil tape, duct tape or similar tape material will not be accepted as duct sealant.

## 2.07 FLUE GAS VENTING - DOUBLE WALL

- A. Provide American Metal Products Company or equal double wall gas vent piping for each item of gas fired equipment supplied.
- B. Double wall pipe shall be UL listed for Type B venting, and shall be constructed of inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel with thicknesses listed:

|                                 | Inner | Outer  |
|---------------------------------|-------|--------|
| Round pipe to 6", oval to 4" -  | .012" | 28 Ga. |
| Round pipe 7"-18", oval 5"-6" - | .014" | 23 Ga. |
| Round pipe 20" to 24" -         | .018" | 26 Ga. |

## 2.08 FLUE GAS VENTING - FABRICATED BREECHINGS AND CHIMNEYS

- A. Provide black carbon steel sheet metal breechings for those venting requirements indicated on the drawings not requiring Class B. Gauges to be as follows:

|                                  |        |
|----------------------------------|--------|
| 12"-24" diameter or longest side | 16 Ga. |
| 25"-36" diameter or longest side | 14 Ga. |

37"-60" diameter or longest side      12 Ga.

Over 60" diameter or longest side      10 Ga.

### PART 3 - EXECUTION

#### 3.01    INSTALLATION OF DUCTWORK

- A.    Fabricate and assemble ductwork in accordance with SMACNA Standards to achieve less than 5% leakage and no objectionable noise.
- B.    Duct shall be fabricated based on field measurements of actual space available and shall be run vertically and horizontally and parallel to the lines of the building. Hold ducts as close as possible to overhead construction and provide adequate support for all ducts.
- C.    Coordinate layout of ductwork with ceiling, lighting and sprinkler installation.
- D.    Ducts passing through interior partition walls shall be sealed with sheet metal flange of same gauge as duct all around perimeter of wall penetrating both sides. Flange shall be minimum 1-1/2" larger than opening and shall be secured to duct and wall.
- E.    Ducts passing through fire rated walls or floors shall be sealed with fire-stop compound equal to Dow Corning Firestop foam to achieve same rating as wall construction.

#### 3.02    INSTALLATION OF FLEXIBLE DUCT

- A.    Do not exceed 6' extended length for any installation of flexible duct. Secure to round duct, grilles, etc. with bands and as described in SMACNA Standards.
- B.    Support flexible duct so that duct is not compressed at any point.
- C.    Centerline radius of flexible duct bends shall not exceed two (2) duct diameters.

#### 3.03    INSTALLATION OF DUCT SEALANT

- A.    Seal all transverse joints and longitudinal seams for seal Class B (0-3" w.g.) with duct sealer. Helical (spiral) lock seams do not require sealant.
- B.    Apply sealant in accordance with Hardcast, Inc. application instructions.

#### 3.04    INSTALLATION OF FLUE GAS VENTS - DOUBLE WALL

- A. Maintain minimum clearances from combustible materials as specified in UL listing.
- B. Support vent pipe and fittings as recommended by manufacturer.

### 3.05 INSTALLATION OF FLUE GAS VENTS - FABRICATED BREECHINGS AND CHIMNEYS

- A. All seams and joints to be welded construction or end joints may be companion flanged.

- B. Reinforce rectangular breechings as follows:

Up to 30" longest side - none required.

31"-35" longest side - 1-1/2" x 1-1/2" x 1/3" angle @ 30" o.c.

37"-60" longest side - 2" x 2" x 1/4" angle @ 30" o.c.

Over 60" longest side - 3" x 3" x 3/8" angle @ 30" o.c.

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EOS

## 15710 - DUCTWORK ACCESSORIES

### PART 1 - GENERAL

#### 1.01 SCOPE

A. Ductwork accessories needed for complete duct installation as follows:

1. Manual volume dampers
2. Control dampers
3. Fire dampers
4. Smoke dampers
5. Combination fire and smoke dampers
6. Turning vanes
7. Access doors
8. Flexible duct and accessories
9. Flexible connectors
10. Duct taps and air scoops

#### 1.02 RELATED WORK

A. The following sections contain work related to this section.

15700 - Sheet Metal Ductwork

15900 - Testing, Adjusting and Balancing

B. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

#### 1.03 QUALITY ASSURANCE

A. Comply with SMACNA Standards "HVAC Duct Construction Standards, 1985".

B. Comply with ASHRAE, NFPA, UL, ASTM and AMCA Standards.

## 1.04 SUBMITTALS

- A. Comply with Section 15030 and submit individual accessory item required for project.

## PART 2 - PRODUCTS

### 2.01 VOLUME CONTROL DAMPERS (MANUAL) - MVD

- A. Dampers shall be single blade butterfly type in ducts up to and including 12" x 12" size; for ducts larger than 12" x 12", in either or both dimensions, the dampers shall be the multi-blade type. All dampers in O.A. ductwork shall shut tightly and have vinyl seals and stainless steel jamb seals.
- B. Single blade butterfly dampers shall be constructed of not less than 16 gauge galvanized steel blade mounted in a galvanized steel frame. For rectangular dampers, the top and bottom edges of the blade shall be crimped to stiffen the blade. Damper shall be provided with an extended rod to permit installation of a damper regulator.
- C. Dampers larger than 12" in either direction shall be multi-blade dampers and shall be opposed blade type, constructed of not less than 16 gauge galvanized steel blade mounted in galvanized steel channel frame. Blade spacing shall not exceed 6" and the top and bottom edges shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide with an extended rod to permit installation of a damper regulator. Dampers equal to Ruskin CD-35 with blade and jamb seals.

### 2.02 HARDWARE FOR MANUAL DAMPERS

- A. Duct mounted regulators with operating handle and locking quadrant shall be provided on manual volume control dampers. Quadrant shaft shall extend beyond duct external insulation, if applicable.
- B. Damper hardware shall be Young Regulator, Duro-Dyne or equal.

### 2.03 VOLUME CONTROL DAMPERS (AUTOMATIC) - AVD

- A. Automatic volume control dampers shall be provided under Section 15800, Automatic Temperature Controls. Installation shall be by sheet metal contractor and shall follow installation procedure specified elsewhere in this section.

### 2.04 FIRE DAMPERS - FD

- A. Provide fire dampers of sizes indicated on drawings with galvanized steel frame with integral wall mounting sleeve.

- B. Dampers shall have rating equal to or greater than rating of wall or floor in which they are installed. Blade assembly shall be curtain type, 100 per cent free opening with no part of blade stack or damper frame located in air stream. Dampers shall be Ruskin IBD-20 or equal.

#### 2.05 SMOKE DAMPERS - SMD

- A. Provide UL555S classified smoke dampers where indicated on drawings.
- B. Dampers shall be constructed with 120 volt, spring return operator mounted outside of air stream. Dampers shall be Ruskin SD-360 or equal with leakage Class 2.

#### 2.06 COMBINATION FIRE AND SMOKE DAMPERS - F/SMD

- A. Provide UL555S classified combination fire and smoke dampers where indicated on drawings.
- B. Dampers shall be constructed of galvanized steel frame to function as wall sleeve, contain 165' fusible link and 120 volt motor operator. Damper motor shall be mounted outside air stream.

#### 2.07 TURNING VANES

- A. Provide shop fabricated or manufactured turning vanes where indicated on drawings.
- B. Turning vanes shall be constructed of 1-1/2" wide curved blades set at 3/4" on center and supported with bars perpendicular to blades. Bars to be set at 2" on center. Set vanes in side strips suitable for mounting in ductwork.

#### 2.08 ACCESS DOORS - AD

- A. Provide access door upstream of each MVD, AVD, SMD, F/SMD, smoke detector, duct mounted coil, or where indicated on drawings.
- B. Access door shall be of same or greater gauge than ductwork where installed, shall have hinged door, handle type latch, insulated for doors installed in insulated duct and be Ruskin ADH-22 or equal with double skin.

#### 2.09 FLEXIBLE DUCTWORK

- A. Provide flexible ductwork at grille connections, length not to exceed 6 feet.

- B. Flexible ductwork shall be Class 1, UL 181 approved air duct with polyester inner liner, laminated to a corrosion resistant wire helix, 1" mineral fiber insulation encased with moisture barrier outer jacket. Flexible ductwork to be Genflex SLS-181 or equal.
- C. Aluminum helix duct is not acceptable.

## 2.10 FLEXIBLE CONNECTORS

- A. Provide flexible duct connections wherever supply or return ductwork connects to vibrating equipment or as indicated on the drawings.
- B. Flexible duct material shall be neoprene coated flameproof fabric crimped into duct flanges for attachment to equipment. Flexible connection must be of adequate flexibility to allow for thermal, axial, transverse, and torsional movement of equipment. Fabric shall be equal to Ventfabrics, Inc.

## 2.11 DUCT TAPS AND AIR SCOOPS

- A. Provide round duct taps at rectangular ducts using Rainaire flanged and gasketed air tight tap, #84ATSD.
- B. Taps shall be provided with self-adhering gasket, air scoop and volume damper.
- C. Spin-in type taps will be accepted only when provided with air scoop properly positioned in duct tap, manual volume damper and sealed with Hardcast sealant at tap.

# PART 3 - EXECUTION

## 3.01 INSTALLATION OF DAMPERS

- A. Assemble multiple section dampers with interconnecting linkage and extend required numbers of shafts through duct for external operation.
- B. Install dampers for free movement inside air stream and without damage to internal duct insulation.

## 3.02 INSTALLATION OF TURNING VANES

- A. Secure turning vanes to inside of elbows and offsets with no damage to internal duct insulation.



### 3.03 INSTALLATION OF ACCESS DOORS

- A. Coordinate location of access doors to be accessible above ceilings. Avoid interference with sprinkler piping, plumbing piping and electrical conduits.
- B. Access doors to be installed to provide air-tight installation.

### 3.04 INSTALLATION OF FLEXIBLE DUCT

- A. Secure flexible duct to galvanized metal duct or air outlet device using adhesive and nylon straps.
- B. Install duct in fully extended condition with no sags or kinks and supported on 36" centers with 1" wide metal strips.

### 3.05 INSTALLATION OF FLEXIBLE CONNECTORS

- A. Provide duct supports on each side of flexible connections.
- B. Install flexible connections after equipment to be attached to has been set in place, properly supported and all piping connected. Seal any air leakage at these connections.

### 3.06 INSTALLATION OF DUCT TAPS

- A. Clean duct surface thoroughly. Cut proper size hole in duct where tap is to be made. Place tap with adhesive covered gasket material against duct to align with hole. Secure with sheet metal screws. Check location of air scoop and operation of damper.
- B. Extend damper operator to exterior of duct insulation.

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EOS

## 15720 - AIR DISTRIBUTION DEVICES

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Provide air distribution devices as indicated by drawings and schedules.
- B. The following type air distribution devices are covered in this section:
  - 1. Ceiling diffusers
  - 2. Sidewall registers and grilles
  - 3. Exhaust grilles
  - 4. Return air grilles
  - 5. Louvers

#### 1.02 RELATED WORK

- A. The following sections contain work related to this section:
  - 15250 - Mechanical Insulation
  - 15700 - Sheet Metal Ductwork
  - 15710 - Ductwork Accessories
  - 15900 - Testing, Adjusting and Balancing
- B. General: Bidding and/or negotiations requirements, general conditions of the contract, supplementary conditions, pertinent portions of sections in Division 1 of the project specifications and the drawings shall apply to the work of this section.

#### 1.03 QUALITY ASSURANCE

- A. Comply with ASHRAE 70 "Method for Testing for Rating the Air Flow Performance of Outlets and Inlets".
- B. Comply with AMCA, NFPA and SMACNA requirements. Provide devices which bear the ADC Certified Rating Seal.

#### 1.04 SUBMITTALS

- A. Comply with Section 15030.
- B. Submittal shall include performance data for each type air device and schedule of air devices indicating drawing symbol, room location, quantity to be furnished, model number, size and accessories to be provided.

#### PART 2 - PRODUCTS

##### 2.01 CEILING DIFFUSERS - CD

- A. Provide manufacturers standard extruded aluminum, standard air ceiling diffuser; verify diffuser is suitable for ceiling in which it is installed. Acceptable manufacturers are Krueger, Price, Metalaire and Carnes.
- B. Provide ceiling diffusers in sizes, blow arrangement and quantities and duct connections shown and in accordance with the following schedule:

CD-1 - Full louver with type 23 Frame, off-white enamel finish, opposed blade damper equalizing grid, round duct connection. Equal to Krueger SHPC – 5S854.

LD-1 Single or multiple slot diffuser, 180 degrees adjustable air pattern, insulated air inlet plenum with duct connection, equal to Krueser 1910 Series.

##### 2.02 SIDEWALL REGISTERS - SWR

- A. Provide manufacturers standard extruded aluminum sidewall register with border styles compatible with wall system in which register is to be installed.
- B. Provide sidewall registers in sizes and quantities shown on drawings and in accordance with the following schedule:

SAR-1 - Double reflection, multi-shutter opposed blade damper, equal to Krueger 5885V.

SAR-1 - Same as above except Krueger 5885H.

##### 2.03 EXHAUST GRILLES - EG

- A. Provide manufacturers standard extruded aluminum exhaust grille compatible with wall or ceiling in which grille is to be installed.

- B. Provide exhaust grilles in sizes and quantities shown on the drawings and in accordance with the following schedule:

EAG - Parallel blade, 1/2" spacing, 35 degrees deflection mounted horizontally for installation in walls or ceilings made of gypboard. Equal to Krueger S585H.

#### 2.04 RETURN AIR GRILLES - RAG

- A. Provide manufacturers standard extruded aluminum return air grille compatible with wall or ceiling in which grille is to be installed.
- B. Provide return air grilles in sizes and quantities shown on the drawings and in accordance with the following schedule:

RAG-1 - Parallel blade, 1/2" spacing, 35 degrees deflection mounted horizontally for installation in walls or ceilings made of gypboard. Equal to Krueger S585H.

#### 2.05 LOUVERS - LV

- A. Provide extruded aluminum louvers to fit wall opening, thickness and to be compatible with wall material in which louver is to be installed.
- B. Louvers shall be flanged frame with 45 degrees stationary blades with overlap and return bends to maintain weatherproof installation. Provide with factory installed birdscreen. Louvers shall be equal to LV-1 American Warming LE-23.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION OF GRILLES, REGISTERS AND DIFFUSERS

- A. Install air outlets, in accordance with manufacturers recommendations.
- B. Coordinate outlet locations with sprinkler, lighting, speaker, and other installations. Locate lay-in ceiling outlets in center of ceiling grid panel.

#### 3.02 INSTALLATION OF LOUVERS

- A. Insure that opening sizes are as required for louver specified.
- B. Provide caulking or other waterproofing methods as required for weatherproof installation.

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EOS

## 15800 - TEMPERATURE CONTROLS BASIC MATERIALS AND METHODS

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. This section defines the minimum equipment and performance requirements for pneumatic, electric and electronic system of automatic temperature control.
- B. Materials and equipment used shall be manufactured by Trane, Barber-Colman or Landis & Staefa.
- C. Provide electrical wiring for automatic temperature controls including interlock wiring for fire alarms, building automation system, smoke detection shut-down of A/C units, burglar alarms, pumps, air unit and other interlocks required for operation of controls in accordance with the sequence of operation. All wiring to be in accordance with Division 16 of these specifications, the National Electrical Code and local code authorities.
- D. Calibrate, adjust, test and set all control components, operate all systems and demonstrate proper operation of system prior to final inspection of the project.
- E. Provide pneumatic piping, air supply, air drier as required.

#### 1.02 RELATED WORK

- A. Power wiring to motors, damper operators, smoke detectors, disconnects in excess of 30 volts shall be by Division 16.
- B. Mounting of motorized dampers shall be by Section 15800.
- C. Installation of automatic control valves shall be by Section 15510.
- D. Control Sequence - Section 15850.

#### 1.03 SUBMITTALS

- A. Comply with Section 15030. Submit electrical wiring diagrams showing terminal to terminal connection of system components, schematic ladder diagram of system and manufacturer's literature on all components to be furnished.
- B. Submit performance data on air compressor, air drier and other pneumatic components. Provide one time piping diagram of pneumatic system.
- C. Submit written sequence of operation with diagrams.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Materials and equipment provided shall be of one (1) manufacturer and shall be one (1) of the following:

Trane, Barber-Colman, Landis & Staefa.

### 2.02 MATERIALS AND EQUIPMENT

- A. Provide control products in sizes and capacities indicated consisting of valves, dampers, thermostats, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer.
- B. Control Valves: Provide factory fabricated control valves for type, body material and pressure class indicated. Where type or body material is not indicated, provide selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system. Except as otherwise indicated, provide valves which mate and match material of connecting piping. Equip control valves with control valve operators, and with proper shutoff ratings for each individual application.
- C. Dampers: Provide automatic control dampers as indicated, with damper frames not less than formed 13 gauge galvanized steel. Provide mounting holes for enclosed duct mounting. Provide damper blades not less than formed 16 gauge galvanized steel, with maximum blade width of 8". Equip dampers with operators, with proper rating for each application. Damper shall be Ruskin RCD-45.
1. For standard applications as indicated, provide parallel or opposed blade design (as selected by manufacturer's sizing techniques) with optional closed-cell neoprene edging.
  2. For low-leakage applications as indicated, provide parallel or opposed blade design (as selected by manufacturer's sizing techniques with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm/sq. ft. of damper area, at differential pressure of 4" w.g. when damper is being held by torque of 50 inch-pounds.
- D. Firestats shall be manual reset limit switch set at 125 degrees F., mounted in return air stream. Equal to Honeywell L4029E.

- E. Smoke detectors shall be ionization or photoelectric type with factory manufactured housings and sampling tubes and shall operate in the range of 300 fpm to 3000 fpm. Smoke detectors shall have indicating lights which show normal and alarm modes and shall be provided with remote reset switches with same indications.
- F. Water Flow Switches: Provide water flow switches of stainless steel or bronze paddle types. Where flow switches are used in chilled water applications, provide vapor proof type to prevent condensation of electrical switch. Provide pressure flow switches of bellows actuated mercury type or snap acting type, with appropriate scale range and differential adjustment for service indicated.
- G. Thermostats or room sensors shall be as specified in Section 15985
- H. Single and multi-colored low voltage and power limited electrical wire and cables placed in air conditioning plenums or plenum chambers or other spaces used for environmental air handling purposes shall meet all standards of HL910 and have a peak optical density not greater than 0.15 and a flame spread of 5 feet or less and shall be classified as having adequate fire resistance and low smoke producing characteristics.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION OF CONTROL MATERIALS AND EQUIPMENT

- A. Install systems and materials in accordance with manufacturer's instructions and rough-in drawings, and details on drawings. Install electrical components and use electrical products complying with requirements of applicable Division 16 sections of these specifications. Mount controllers at convenient locations and heights. Insure that proper openings are provided for ductwork.
- B. Unit-Mounted Equipment: Where control devices are indicated to be unit-mounted, ship electric relays, electric switches, valves, dampers, and damper motors to unit manufacturer for mounting and wiring at factory.
- C. Mount thermostats and room sensors 60" A.F.F. unless otherwise noted.

#### 3.02 INSTALLATION OF WIRING FOR CONTROLS

- A. Install complete control wiring system for electric control systems. Conceal wiring, except in mechanical rooms and areas where other conduit and piping is exposed. Provide multi-conductor instrument harness (bundle) in place of single conductors where number of conductors can be run along common path. Fasten flexible conductors bridging cabinets and doors, neatly along hinge side, and protect against abrasion. Tie and support conductors neatly.

1. All wiring above 24 volt will be in conduit.
  2. Conduit for 24 VAC or lower will be in accordance with local codes.
  3. Wiring exposed to outdoor elements will be in rigid conduits.
- B. Number-code or color-code conductors appropriately for future identification and servicing of control system.
- C. Conduit and wiring shall not be run concealed inside ducts or under duct insulation.

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EOS



## 15900 - TESTING, ADJUSTING AND BALANCING

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Extent of testing, adjusting and balancing work is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution system, hydronic piping systems, and associated equipment and apparatus of mechanical work.
- B. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, and recommending modifications to work as required by contract documents.
- C. Component types of testing, adjusting and balancing specified in this section includes air-conditioning units, ductwork systems, air outlets, inlets, coils, and heating units.

#### 1.02 QUALITY ASSURANCE

- A. Comply with American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE), National Environmental Balancing Bureau (NEBB), or Associated Air Balance Councils (AABC) recommendations pertaining to measure, instruments, and testing, adjusting and balancing.
- B. Do not proceed with testing, adjusting and balancing work until work has been completed and is operable.
- C. Do not proceed until work scheduled for testing, adjusting and balancing is clean free from debris, dirt and discarded building materials.

#### 1.03 SUBMITTALS

- A. Comply with Section 15030. Submit test report signed by test and balance supervisor who performed TAB work.

### PART 2 - PRODUCTS

#### 2.01 PATCHING MATERIALS

- A. Except as otherwise indicated, use same products as used by original installer for patching holes in insulation, ductwork and housing which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposed. At tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings. Do not leave test holes uncovered.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Examine installed work and conditions under which testing, is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to tester. contractor and roofing contractor. Insure that proper openings are provided for ductwork.
- B. Coordinate installation of dampers, balance valves, test ports, etc. with installer to insure adequate test and balance devices are installed to perform work properly.

### 3.03 TESTING, ADJUSTING AND BALANCING

- A. Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards.
- B. Air Balance: The air balance shall include the following air tests in accordance with the following requirements for split systems serving the lobby, great room, conference center, business center, offices and corridors:
  - 1. Test and adjust blower RPM to design requirements (within +/- 5% of design requirements).
  - 2. Test and record motor full load amperes and voltages on all phases.
  - 3. Test and adjust system for design re-circulated air cfm.
  - 4. Test and adjust outside system for design cfm outside air.
  - 5. Test and record entering air temperatures of heating and cooling coils (both db and wb of cooling coils).
  - 6. Test and record leaving air temperatures of heating and cooling coils (both db and wb of cooling coils).
  - 7. Adjust all main supply and return air ducts to proper design cfm.
  - 8. Test and adjust each outlet and inlet (diffuser, grille and register) to within +/- 10% of design requirements. Use proportional method of balancing.
  - 9. Readings and tests of diffusers, grilles, and registers shall include required cfm and test resultant cfm after adjustments.

\*\*\*EOS\*\*\*

## SECTION 16010 - GENERAL PROVISIONS

### PART 1 - GENERAL

1.01 RELATED DOCUMENTS: This section supplements all sections of this Division and shall apply to all phases of work specified herein, shown on the drawings, or required to provide a complete installation of electrical systems.

#### 1.02 DESCRIPTION OF WORK:

A. SPECIFICATIONS AND DRAWINGS: Shall be complementary and be used for the complete interpretation of the electrical work.

1. Unless noted or modified by specific notation to the contrary, the indication and/or description of any electrical item in the documents carries with it in the instruction to furnish, install and connect same. It shall be understood that the intent governs the work, regardless of whether or not this instruction is explicitly stated.
2. No exclusion from or limitation in drawings or specifications for the electrical work shall be reason for omitting the appurtenances, accessories, or devices necessary to complete any required system or item of equipment or compliance with codes.
3. The drawings are shown in part diagrammatic, intended to convey the scope of work, indicating the general arrangement of equipment, conduit and outlets. Follow the drawings in laying out the work and verify places for the installation of the materials and equipment. Wherever a question exists as to the exact intended location of outlets or equipment, obtain instructions from the Architect and Engineer before proceeding with the work.

B. WORK INCLUDED: Furnish all labor, material, services and skilled supervision necessary for the construction, erection installation, connections, testing and adjustment of all circuits and electrical equipment specified herein, or shown or noted on the drawings, and its delivery to the owner complete in all respects ready for use.

C. COORDINATION OF WORK:

1. Plan all work so that it proceeds with a minimum of interference with other trades. Inform all parties concerned of openings required for equipment or conduit in the building construction for electrical work and provide all special frames, sleeves and anchor bolts as required. Coordinate the electrical work with the mechanical installation.

2. Work lines and established heights shall be in strict accordance with architectural drawings and specifications insofar as these drawings and specifications extend. Verify all dimensions shown and establish all elevations and detailed dimensions not shown.
3. Lay out and coordinate all work well enough in advance to avoid conflicts or interference's with other work in progress so that in case of interference the electrical layout may be altered to suit the conditions, prior to the installation of any work and without additional cost to the owner. Conflicts arising from lack of coordination shall be this Contractor's responsibility.

D. COOPERATION WITH OTHER TRADES:

1. Perform this work in conformity with the construction called for by other trades and afford reasonable opportunity for the execution of their work. Properly connect and coordinate this work in such a manner as not to delay or interfere with the work of other trades.
2. Examine the drawings and specifications for the general and mechanical work and the work of other similar trades. Coordinate this work accordingly.
3. Promptly report to the Architect any delay or difficulties encountered in the installation of this work which might prevent prompt any proper installation, or make it unsuitable to connect with or receive the work of others. Failure to so report shall constitute an acceptance of the work of other trades as being fit and proper for the execution of this work.

1.03 SHOP DRAWINGS, SUBMITTALS AND OPERATING INSTRUCTIONS:

- A. GENERAL: Submit all necessary shop drawings and factory literature for Architect/Engineer approval.
1. They shall be approved prior to final fabrication and/or purchase.
  2. Shop drawings shall fully explain all procedures involved in executing a complete operational electrical work.
  3. Factory literature shall be specific for all factory assembled equipment, fixtures, devices, and items of equipment.
  4. All submittals shall properly indicate to the pertinent equipment their external connections for field installation and the necessary field installation instruction.

5. They shall be submitted in the required number of copies and on type of paper in conformance with the GENERAL CONDITIONS.
- B. SAMPLES: Submit samples upon request for approval - one of each with proper tag indicating project and intended location and function.
- C. OPERATING INSTRUCTIONS: Included in the electrical work is the issuance of operating instructions for all equipment requiring service.
  1. Provide qualified personnel for demonstration purposes, the date to be convenient to Architect and Owner.
  2. Provide three (3) copies of all pertinent operating and maintenance instructions in 3-hole binder manual.
  3. Provide the name, address and telephone number of the manufacturer's local service representative of each item of equipment included in the above requirements.
  4. Provide assistance by qualified field personnel for aiding and helping the demonstration personnel.

#### 1.04 AS BUILT RECORD DRAWINGS - ONE LINE DIAGRAM:

- A. GENERAL: Electrical Contractor, at completion of job, shall give general contractor one complete set of electrical drawings reflecting all as built conditions.
  1. Mount full sized print of store electrical system One-Line Diagram on inside wall of main switchboard room.

#### 1.05 CODES, PERMITS AND FEES:

- A. CODES: All work shall meet or exceed all legal requirements and the latest requirements of the National Electric Code, and all State, County, Municipal and other authorities having jurisdiction over electrical construction work at the project.
  1. Comply with all applicable building ordinances and codes. Where the contract documents exceed minimum requirements, the contract documents take precedence.
- B. PERMITS AND FEES: Comply with all requirements for permits, licenses, fees and codes. Permits, licenses, fees and arrangements required for the work under this contract shall be obtained by the Contractor at his expense, and made available at the completion of the work, unless otherwise specified.

1. Comply with the requirements of the applicable utility companies serving this project. Make all arrangements with the utility companies for proper coordination of the work.

#### 1.06 MATERIALS AND EQUIPMENT FURNISHED BY OWNER:

- A. CONTRACTOR: The electrical work includes the installation or connection of certain materials and equipment furnished by the owner. The Electrical Contractor shall do the following:
  1. Coordinate all their delivery and security.
  2. Unload from arriving delivery vehicles on any designated area on the job site.
  3. Handle and store on field storage area until the time of permanent placement.
  4. Provide field make-up and internal wiring necessary for their intended operation.
  5. Mount in place and provide supporting members and fastening necessary to accommodate specific loading requirements.
  6. Examine all items for all damages incurred during delivery for claims to repairing and/or replacing same.
  7. Foundations for apparatus and equipment will be furnished by others, unless otherwise noted or detailed.

### PART 2 - PRODUCTS

#### 2.01 EQUIPMENT AND MATERIALS:

- A. GENERAL:
  1. Equipment and fixtures shall be connected providing circuit continuity in accordance with applicable codes whether or not each conductor, conduit, or protective device is shown between such items of equipment or fixtures, and the point of circuit origin.
  2. Unless otherwise specified, equipment and materials of the same type or classification, and used for the same purpose, shall be products of approved manufacturers.

3. Use only new, unweathered, and unused material, except as specifically noted.

B. APPLICABLE DOCUMENTS: Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications of standard rules of the following:

- |     |                                                 |           |
|-----|-------------------------------------------------|-----------|
| 1.  | American Institute of Steel Construction        | AISC      |
| 2.  | American Society for Testing and Materials      | ASTM      |
| 3.  | Federal Specifications                          | FED.SPEC. |
| 4.  | Institute of Electrical and Electronic Engineer | IEEE      |
| 5.  | Insulated Power Cable Engineers Association     | IPCEA     |
| 6.  | National Electrical Code                        | NEC       |
| 7.  | National Electrical Manufacturer's Association  | NEMA      |
| 8.  | National Electrical Safety Code                 | NESC      |
| 9.  | National Fire Protection Association            | NFPA      |
| 10. | Occupational Safety and Health Act              | OSHA      |
| 11. | Underwriters' Laboratories, Inc.                | UL        |
| 12. | American National Standard Institute            | ANSI      |
| 13. | International Electrical Counsel                | IEC       |

C. IDENTIFICATION OF EQUIPMENT: Identify individually each piece of equipment with a laminated micarta nameplate black/white core and 1/4" high engraved letters. Temporary identification is required upon installation.

1. Equipment to be labeled.
  - a. Switchboards.
  - b. Panelboards.
  - c. Transformers.

- d. Disconnect Switches (with name of equipment served).
  - e. Telephone Cabinets not located in electric panel room.
  - f. Emergency System Equipment.
  - g. Lighting Control Panels.
  - h. Fire Alarm Panels.
2. Do not use abbreviated terms for identification. Spell out in full the proper name and number of each identified equipment, i.e., PANEL-LPA-1 OR AIR HANDLING UNIT - AH 5.
  3. Additional labeling of disconnect switches: Each and every disconnect installed by this contractor shall have affixed on front a label, black on safety yellow (5" X 2"), reading: "USE LOCKOUT DEVICE DURING MAINTENANCE OR ANY OPERATOR ADJUSTMENT". Label shall be pressure-sensitive flexible plastic with protective mylar overlay and equal to Seton Name Plate Co. catalog no: SL104.
  4. Additional labeling of switchboards, distribution boards, and panelboards: Each and every switchboard, distribution board, and panelboard shall have affixed on front, as detailed below, a label or labels, black on safety yellow (5" X 2"), reading: "LOCKOUT FOR SAFETY". Label shall be pressure-sensitive flexible plastic with protective mylar overlay and equal to Seton Name Plate Co. catalog no. SL101. Switchboards shall have one label affixed to each vertical section of the switchboard at an elevation of approx. 5'-0" AFF. Each distribution board and panelboard and each section thereof shall have one label affixed at an elevation of approx. 5'-0".

## 2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

- A. For products specified herein, bids shall be based on products named in project manual and on plans, or on items designated as an "approved equal". A product not named in project manual or on plans will only be acceptable when such product meets all other requirements of project specifications, including specifications of originally specified products' manufacturer as of date of contract documents and request has been made for product substitution.

The first manufacturer listed in these specifications and the manufacturer and catalog number listed in the equipment schedules was used for design, layout, performance, physical size, space and structural requirements, electrical requirements and general appearance. Any equipment selected from the approved alternate list of manufacturers must be compatible with the facility and meet all requirements of the contract documents. Any changes required due to the



alternate selected equipment being different from the design basis equipment, shall be the responsibility of the mechanical contractor and he shall pay for any increased costs as a result of these changes.

- B. Requests for approval of a product as equal will not be considered unless sufficient data for evaluation is received seven (7) days prior to the bid opening date.

### PART 3 - EXECUTION

#### 3.01 GENERAL:

- A. EQUIPMENT AND MATERIAL: Install in a neat and workmanlike manner and align, level and adjust for satisfactory operation. Install equipment so that all parts are easily accessible for inspection, operation, maintenance and repair.
  - 1. Where marring or disfigurement has occurred, replace or refinish the damaged surfaces as directed and to the satisfaction of the Architect.
  - 2. Provide the design, fabrication and erection of supplementary structural framing required for attachment of hangers or other devices supporting electrical equipment.
  - 3. Provide framing members of standard rolled steel shapes, A-36 steel. Provide members welded to structural members equal to the specification for the main structural member. Provide "simple beam" type framing with end connections welded or bolted for shear loads. Use cantilevers only when detailed or specifically approved by the Architect. The Architect's approval is required for location of supplementary framing. Use only certified welders.
- B. OUTLET LOCATION:
  - 1. Center all outlet boxes with regard to paneling, furring and trim. Repair or replace damaged finishes. Set outlet boxes plumb and extend to the finished surface of the wall, ceiling or floor without projecting beyond same.
  - 2. Install symmetrically all receptacles, switches, and devices shown and where necessary set the long dimension of the plate horizontal or ganged in tandem.
  - 3. More than one device in same location to be grouped under common (multi-toggle) plate.

C. CUTTING, PATCHING AND PIERCING:

1. Obtain written permission of the Architect before cutting or piercing structural members.
2. Use craftsmen skilled in their respective trades for cutting, fitting, repairing, patching of plaster and finishing of materials including carpentry work, metal work or concrete work required for this work. Do not weaken walls, partitions or floors with cutting. Holes required to be cut in floors must be drilled without excessive breaking out around the holes. Patching and/or refinishing will be determined by the Architect.
3. Sleeves shall be installed flush with finished walls, finished ceilings or finished floors, sized to accommodate the raceway, unless otherwise specified.
4. Roof penetration and repairing shall be done by others.
5. Provide watertight conduit openings through floor slabs, masonry walls and continuous partitions. Tightly caulk space between conduit and building materials non-flammable sealant.
6. Seal equipment or components exposed to the weather and make watertight and insect proof. Protect equipment outlets and conduit openings with temporary plugs or caps at all times that work is not in progress.

D. SPECIAL CONSIDERATIONS:

1. Locate switches, receptacles and pull boxes to provide easy access for operation, repair and maintenance, and, if concealed, provide access doors.
2. Install floor-mounted equipment on 4" concrete housekeeping pad as specified in appropriate sections of this specification.
3. Provide Belleville washers on all bolted connections. Split ring washers are not acceptable.
4. Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment and installations from damage of any kind. The Architect may reject any particular piece or pieces of material, apparatus or equipment scratched, dented or otherwise damaged.

5. Prepare all fittings, boxes, supports and panelboards exposed for painting by removing all oil, grease and dirt. Employ the necessary precautionary methods to prevent scratching or defacing of all electrical apparatus and devices.
6. Exposed conduit installed after room has been painted shall be painted to match room finish by this Contractor.
7. Provide hot dip galvanized components for ferrous materials exposed to the weather.
8. The use of roof deck for support of lighting fixtures, conduit, raceways, and other electrical equipment is not permitted. Provide beam clamps, hanger rods, conduit and pipe hangers/supports and straps.

E. NOISE LIMITATION:

1. Perform all work to assure minimal noise produced by the electrical equipment and installation.
2. Check and tighten all plates, covers, doors and trims used in conjunction with electrical equipment.
3. Remove and replace any device or equipment which is found to emit noise level higher than industry standards. Perform all work in accordance with the field instructions issued by the Architect to alleviate such conditions.
4. All equipment requiring tightening and all device, lug and connector terminals shall be tightened to the manufacturer's prescribed torque value.

3.02 TESTS:

A. GENERAL:

1. Perform all tests deemed necessary to establish full conformance with the specifications, their intent, drawings and suitable operation of each system.
2. Before application for final acceptance will be considered, all prescribed tests shall be performed and statement to that effect be submitted, signed by the party responsible for conducting such test and the party responsible witnessing same.
3. Correct promptly all defects and deficiencies discovered in any of the electrical work during testing, and demonstrate compliance to this effect.

### 3.03 GUARANTEES AND CERTIFICATIONS:

- A. GUARANTEES: All work to be guaranteed in conformity with the requirements of the "Guarantee" portion of the GENERAL CONDITIONS.
  - 1. All test results shall be submitted and made part of the final acceptance.
- B. CERTIFICATIONS: All certificates required by governing authorities shall be submitted with no reservations attached.

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EOS

## SECTION 16110 - RACEWAYS

### PART 1 - GENERAL

- 1.01 WORK INCLUDED: This section covers raceways, fittings, and underfloor ducts, complete.
- 1.02 WORK SPECIFIED ELSEWHERE:
- A. 16120 "Conductors"
  - B. 16420 "Electrical Service Entrance"
  - C. 16450 "Grounding"

### PART 2 - PRODUCTS

- 2.01 MATERIALS:
- A. RACEWAYS:
    - 1. Rigid conduit shall be hot dipped galvanized steel heavy wall. The conduit shall bear the U.L. label and shall conform to U.L. 6 and ANSI C80.1.
    - 2. Rigid aluminum conduit shall be heavy wall as manufactured by Alcoa, Kaiser, or approved equal.
    - 3. Electrical metallic tubing (EMT) shall be galvanized steel thin wall. The tubing shall bear the U.L. label and shall conform to U.L. 797 and ANSI C80.3.
    - 4. Quick coupling EMT shall only be as manufactured by Triangle PWC (UNI-COUPLE EMT) and Allied (KWIK-FIT EMT).
    - 5. Flexible metallic conduit shall be galvanized steel tape formed into an industry standard interlocking coil as manufactured by Republic, Triangle, or approved equal.
    - 6. Polyvinyl chloride (PVC) conduit shall be heavy wall Schedule 40 as manufactured by Carlon Electrical, Visqueen, or Condux. The conduit shall bear U.L. label and shall conform to U.L. 651. Schedule 80 PVC where required, by Carlon Electrical, Visqueen or Condux.

7. Electrical nonmetallic tubing (ENT) shall meet requirements of NEMA TC-13 and shall be U.L. listed. Approved manufacturer: Carlon.
8. Intermediate metallic conduit (IMC) shall be galvanized steel. The conduit shall bear the U.L. label and shall conform to U.L. 1242 and ANSI C80.6.
9. Minimum/maximum sizes.
  - a. No conduit shall be less than 1/2" trade size. Regardless of wiring no conduit in concrete or masonry shall be less than 3/4".
  - b. No conduit shall be larger than 5" trade size.
  - c. Utilize factory manufactured elbow 1-1/4" trade size and larger.
  - d. Conduit in furred columns shall be 1-1/4" maximum in size.
10. BX is specifically not permitted.

B. CONDUIT FITTINGS:

1. Rigid metal conduit fittings for heavy wall conduit and IMC shall be of the threaded type. No other type of fitting shall be used unless specific approval is given.
2. EMT fittings shall be of the concrete-tight, kwik-fit or rain-tight type as required by location. Indenter type fittings not acceptable. No set screw type fittings permitted on conduits embedded in the floor slabs or buried conduits.
3. Flexible metallic conduit fittings shall be specifically designed for use with same and shall have smooth rounded ends for wire protection.
4. PVC conduit fittings shall be those recommended by the PVC conduit manufacturer.
5. ENT fittings shall be listed by U.L. for concrete tight applications. Fittings shall be as manufactured by the ENT manufacturer.
6. Special fittings shall be listed or approved equal
  - a. Sealing Gland Assembly OZ, Type FSK

- |    |                                   |                                                          |
|----|-----------------------------------|----------------------------------------------------------|
| b. | Expansion Joints                  | OZ, Type AX or TX<br>with bonding jumpers<br>and clamps. |
| c. | Expansion and Deflection Fittings | OZ, Type DX                                              |
| d. | Cast Metal Conduit Fittings       | Crouse-Hinds, Condulets                                  |
| e. | Combination Coupling              | OZ, Type ETR                                             |
| f. | Seal Fitting                      | OZ, Type EYA                                             |
7. Beam clamps used to secure conduit support apparatus shall be cast iron type.

### PART 3 - EXECUTION

#### 3.01 RACEWAYS:

##### A. INSTALLATION:

1. All conduits to run concealed, except as follows:
  - a. Mechanical and Electrical Equipment Rooms.
  - b. Unfinished spaces.
  - c. Where indicated on the contract drawings.
2. Make all cuts square with no reduction in trade size and ream out all burrs.
3. Provide expansion fittings for conduits crossing building expansion lines.
4. Cap all conduits with proper fittings until wires are pulled in.
5. All conduits installed in hollow metal, stud and wallboard, any movable or semi-permanent floor to ceiling partition shall originate from ceiling plane. No stub-ups from floor slabs, except for partitions less than floor to ceiling in height.
6. Underground conduits, conduits installed in wet areas, and conduits under grade slab shall be rigid steel painted with Bituminous paint or PVC. (Refer to Section 16450, "Grounding") Conduits installed within reinforced grade level slabs shall be PVC, EMT, ENT, or rigid steel and the maximum size shall be 3/4" trade size. Conduits installed in partial cuts of set grade level slabs shall be PVC, EMT, ENT, or rigid steel.

7. Conduits in or under slabs not on grade shall be EMT, IMC, or rigid steel.
8. Conduits underground for remote facilities services shall be encased in minimum 3" concrete, 3000 PSI. For specific electrical service entrance requirements see specification Section 16420.
9. All conduits penetrating walls or ceiling of the HVAC Fan Room(s) shall be rigid steel and sealed at the conduit joint just prior to entering the fan room(s) to prevent the passage of air. Conduits entering the fan room(s) through the floor shall be rigid steel and sealed at the first conduit joint above the floor. Utilize conduit seal fittings.
10. Seal off all conduits with appropriate fittings penetrating:
  - a. Foundation Walls
  - b. Hazardous Areas
  - c. Roof Seal (See General provision)
  - d. Waterproof Deck and/or Wall
11. Conduits in concrete shall conform to the following:
  - a. They shall be located below reinforcing material.
  - b. They shall not displace structural steel.
  - c. They shall be routed not to cause structural weakness.
  - d. They shall have a minimum of 1" separation from any surface of the concrete.
  - e. They shall be routed in accordance with field instructions issued for extenuating conditions by the ARCHITECT. These instructions do not entitle Contractor to extra compensation.
  - f. No conduit shall be permitted in unreinforced concrete slabs on grade. Conduit in these locations shall be placed in gravel base beneath such slabs unless otherwise noted on the drawings.
12. Exposed conduit shall run straight at right angles and parallel with building lines. This requirement is also applicable to all areas defined as exposed by the NEC, Article 100.



13. All exposed vertical feeder conduits in unfinished areas are to be installed adjacent to permanent non-movable walls. The installation in any other location is not acceptable. (Movable wall is defined as non-masonry.)
14. Stub-ups or sleeves through concrete slab shall be rigid steel and shall extend 12" above finished floor.
15. All equipment requiring motion or noise separation shall be terminated with flexible metallic conduit. All flexible metallic conduit exposed to weather shall be liquid-tight.
16. No aluminum conduit shall be embedded in concrete or earth.
17. Support all conduits with rigidly mounted junction boxes, metal straps, hangers or clamps to provide a rigid installation. All supports to be independent from other equipment and in a manner not to impede the ready removal of other conduits, pipes and structural supports of other trades.
18. Conduits shall be supported from the structure support members or walls. Supporting from the ceiling grid system hanger wires, T-bars or cross T-members, except as specifically noted herein is not permitted. Penetration of roof deck is not permitted for hangers, clamps, etc.
19. Plenum routed flexible metal conduit and armor cable branch circuits shall be individually secured at code required intervals using ceiling T-bar wire clips or as indicated for conduits above. They shall not lie on the ceiling tiles or grid system.
20. Provide all empty conduits with appropriate pulling cord or wire.
21. All conduits shall be installed in an acceptable workmanlike manner.
22. No conduits may be run on the floor surface or in such a manner as to be hazardous to traffic.
23. For PVC conduit utilize solvent cement joints for all fittings and make all joints watertight. Provide adapters for connections to metal components. Continuous ground wire is required. See Section 16450, Grounding.
24. Metallic conduits only shall be installed in ceiling plenums, hollow walls, furred spaces and column furring.
25. Make all conduit joints tight, no running threads are accepted. If necessary, use ERICKSON type couplings.

26. Provide locknut and bushing for conduit termination. Bushing shall be insulated 1-1/4" trade size and above.
27. All conduits exposed to mechanical injury and in hazardous areas shall be heavy wall.
28. ENT shall only be used encased in concrete in the on grade slab.
  - a. Utilize cement labeled for use with ENT for joints for all fittings and make concrete tight per manufacturer instructions.
  - b. Appropriately secure in place to prevent floating during concrete pour.
29. For metallic raceway and conduits stubbed above ceiling used for communication and other power limited wiring install plastic ring or bushing on end above the ceiling.
30. ENT not acceptable for exposed work.
31. EMT shall not be used for direct earth burial for outside site work.
32. Schedule 40 PVC conduit shall be used for electrical service entrance feeders. Encase in concrete as required by local code, NEC, or utility company requirements.
33. Conduit for cable television wiring shall be installed with long radius elbows.

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EOS

## SECTION 16120 - CONDUCTORS

### PART 1 - GENERAL

1.01 WORK DESCRIPTION: This section covers all conductors 600V or less.

1.02 WORK SPECIFIED ELSEWHERE: Raceways, Section 16110.

### PART 2 - PRODUCTS

2.01 MATERIAL:

#### A. GENERAL:

1. All conductors shall be 98% minimum conductivity soft, properly refined copper, solid, for size 10 AWG and smaller. Size 8 AWG and larger conductors shall be stranded copper. Stranded conductors smaller than 8 AWG are not allowed.
2. Minimum size conductor for power and lighting circuits shall be 12 AWG.
3. Maximum size conductor for feeders and power circuiting shall be 500MCM.
4. BX cable is not permitted. Non-metallic sheathed cable (Romex) is permitted for branch circuit conductors if approved by local authorities.
5. MC cable with solid copper conductors and approved for use fittings is permitted with the following restrictions. MC cable (individual circuit, 3 #12 insulated conductors) may be used for receptacle outlet drops and lighting switch drops in gypboard and stud walls, individual fixture drops. MC cable shall not be run between lighting junction boxes. Not approved for exposed work.
6. Conductors for HVAC 120V control wiring shall be size 14 AWG. For low voltage exception refer to HVAC specification Division 15.
7. The branch circuit wiring shown on the drawings is for conduit and wire; however, non-metallic sheathed cable may be used for branch circuits inside guest rooms if allowed by local code. Not acceptable for exposed work.

B. ALUMINUM CONDUCTORS:

1. Aluminum feeders are allowed, if permitted by local authorities and installed in accordance with the manufacturers recommendations. All feeder terminations must be done using approved AL/CU terminal fittings and proper lubricant to prevent oxidation.

C. LOW VOLTAGE WIRE:

1. U.L. listed and approved non-conduit types must be used unless not legally permitted. Use must comply with the following:
2. All signal wire shall meet or exceed applicable portions of specifications in regard to the conductors. The non-conduit cable jacket material description will be substituted for conventional cable jacket description.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION:

A. CONDUCTORS:

1. All conductors shall be continuous from outlet to outlet.
2. Leave sufficient slack on all runs to permit secure connection of equipment.
3. All conductors shall be pulled simultaneously when installed in a common raceway. Delay pulling in until the project progresses to a point where conductors shall not be exposed to injury and moisture.
4. Swab all conduit prior to pulling the conductors and mandrel, with 85% ball, all conduits 2" and larger.
5. Use only specifically manufactured lubricant for wire pulling purposes.
6. Dress and lace wires and cables in all cabinets and pull boxes and use necessary insulated support to prevent shifting.
7. Identify feeders at each pull box and cabinets with permanent non-metallic band or tag.
8. All conductor insulation shall be rated for 600 volt, unless otherwise noted.

9. Utilization of insulation shall be as follows:
- a. Branch circuits and feeders, No. 10 and smaller. THHN
  - b. Branch circuits and feeders, No. 8 and larger. THW, THWN, THHN
  - c. Main and subfeeders. THW, THWN
  - d. Fixture wires in continuous fluorescent fixture channels. #12 THHN
  - e. Direct burial or underground RHW-USE, THWN
  - f. Dry areas above 105°F THHN
  - g. Branch circuits and feeders minimum #12 copper up to 100 lft; #10 copper over 200 lft.
10. Exterior of wires shall be color coded.
- a. Color coding shall clearly indicate the difference between:
    - (1) Phase wires of different voltage systems.
    - (2) Neutral and phase wires of each voltage system.
    - (3) The grounding system wire.
  - b. Unless required otherwise by local code authorities use the following color coding scheme:  
  
120/208-240 Volt System  
Phase A - Black  
Phase B - Red  
Phase C - Blue  
Neutral - White
  - c. All equipment grounding conductors are to be green in color. All isolated ground conductors are to be green in color with an overlaid black or yellow stripe.

- d. In sizes and insulation types where factory applied colors are not available, colored plastic tape in overlapping turns shall be applied at all terminal points and in all points of splicing. Tape shall be applied at a minimum intervals of 6" along the wires and cables.

B. SPLICING AND TERMINATING:

1. Maintain all splices and joints in accessible enclosures, where easy inspection is available.
2. Join solid conductors with expendable type insulated coiled steel spring connections (wire nut), or by twisting and soldering.
3. Terminate solid conductor by means of a neat and fast application directly to the binding screw or post of the equipment.
4. Join, tap and terminate stranded conductors #6 AWG and larger by means of solder sleeves, taps and lugs with applied solder or by means of bolted saddle type or pressure indent type connectors, taps and lugs. Apply pressure indent type connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector.
5. Except where wire nuts are used, build up insulation over conductor joints to a value, equal both in thickness and dielectric strength, to that of the factory applied conductor insulation. Insulation of conductor taps and joints shall be by means of half-lapped layers of rubber tape, with an outer layer of friction tape; by means of half-lapped layers of approved plastic electric insulating tape; or (in the case of bolted type connector joints) by means of split insulating casings molded specifically to insulate the particular connector and conductor, and fastened with stainless steel or non-metallic snaps or clips.
6. Exclude splicing procedures for neutral conductors in lighting and appliance branch circuitry which utilize device terminals as the splicing points.
7. Exclude joints or terminations utilizing solder in any conductors used for grounding or bonding purposes.
8. Exclude all but solder or pressure indent type joints in conductors used for signalling or communications purposes.

### 3.02 INSTALLATION OF LOW VOLTAGE WIRE:

- A. CABLE INSTALLED WITHOUT CONDUIT: Shall not be visible in any area accessible to the public. Cables shall be routed in all areas so as to minimize the chance of accidental mechanical damage during any and all phases of stores operations. Cable shall be supported with cable ties from the structure above or with approved T-bar wire clips two feet above ceiling tile and not lay on the ceiling grid system.
- B. CONVENTIONAL CONDUIT: Must be used where cable is subject to damage, and/or required by the National Electrical Code or local governing authorities. When low voltage cable is routed from exposed into conduit, or pulled into wall or floor outlet, utilize connectors and fiber bushings to prevent cable jacket damage.
- C. LOW VOLTAGE CLASS 2 WIRING IN RETURN AIR PLENUMS: Teflon or similarly insulated signal conductors may be utilized where low voltage, Class 2 signal cable is permitted by local codes as an alternate to conventional PVC insulated signal cable installed in conduit. Use must also comply with the following:
  - 1. All low voltage signal wire shall meet or exceed applicable portions of specifications in regard to conductor characteristics. Only the Teflon insulation cable jacket material will be substituted for conventional PVC cable jacket material. The wire characteristics shall remain unchanged.
  - 2. Power limited circuit signal cable as described here and in low voltage systems portions of this specification must by U.L. listed as having adequate fire resistance and low smoke producing characteristics and approved for the intended use (See National Electrical Code Section 725-2b and 760-4d). Low voltage, Class 2 signal cables (Teflon insulation) shall be manufactured by Hi-Temp Wires, Inc., Rockbesto Wires and Cable, Teledyne Thermatics, Belden Wire, Phalo or approved equal.
  - 3. The low voltage, Class 2 signal cable installed without conduit shall not be visible in any area accessible to the public. Cables shall be routed in all areas so as to minimize the chance of accidental mechanical damage during any and all phases of the store's operations. Cable shall be supported with cable ties from the structure above and not from the ceiling T-bar grid system including ceiling suspension wires.

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EOS

## SECTION 16130 - BOXES

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: This section covers junction, pull and outlet boxes.
- 1.02 SUBMITTALS: Submit shop drawings on floor boxes and poke-thru devices for approval.
- 1.03 WORK SPECIFIED ELSEWHERE: "WIRING DEVICES 16140".

### PART 2 - PRODUCTS

#### 2.01 MATERIAL:

- A. BOXES: Shall be manufactured from galvanized industry standard gauge steel, cast iron, cast aluminum or PVC as specified below.
  - 1. Power distribution boxes shall be 8" X 8" X 4" (minimum) with blank cover. Each side and bottom (when installed) shall have a minimum of 2 each 3/4" knockouts. Manufacturers: Lea products of Everett, Ma; Unity Manufacturing of Garland, TX; or approved equal.
  - 2. J-boxes shall be Steel City #6G-1/2 & 3/4 with blank cover 6-GCB or Raco #955 with blank cover #848.
- B. FLOOR BOXES: Deep cast iron, rectangular or round type, fully adjustable before and after concrete pour. All floor boxes shall have covers, as specified in "Wiring Device - 16140". Boxes shall be Hubbell B-2436, B2503, B-4233, B-4333 or Steel City 641, 642, 643, 601 (Round) or Walker Parkerburg 889 (Round) or LEW 520 (round), 1101-DFB, 6262 - DFB/6304-S, 6263 - DFB/(2)6304 - S. See exception under "Floor Outlets" in Part 3 of this section.
  - 1. For grade slab only and where approved by all governing authorities non-metallic floor boxes are permitted. CARLON catalog #E971FB with E97ABR adapters, Hubbell #PFB1 with PFBA1 adapter, Steel City #68-P with #600-4-FL brass ring, WALKER 883 and LEW L-56001. Covers and carpet flanges per "Wiring Devices 16140".
  - 2. Floor boxes shall be furnished with all necessary accessories for a complete installation.



## PART 3 - EXECUTION

### 3.01 INSTALLATION:

#### A. BOXES:

1. All boxes shall be installed in accessible areas with removable covers.
2. All boxes shall be firmly supported from the building structure.
3. All outlet boxes shall be set flush with the surface of the wall, floor, or ceiling in concealed installation.
4. All boxes installed shall conform to the criteria governing the displacement and bending radius of wires and cables contained within them.
5. Provide segregated boxes or proper barriers where different services or systems are following the same routing.
6. Include all boxes required for a complete system regardless of indication on the contract drawings.
7. Provide pull or junction boxes to limit conduit runs to the equivalent of 270 degree bends and to facilitate wire pulling.
8. Close up all unused openings in boxes with approved fittings.
9. Provide an outlet box for each individual wiring device, lighting fixture, and communication component, unless otherwise noted.
10. Multiple devices indicated at a single location shall utilize gang mounted under common cover where possible.
11. Conceal outlet boxes in back of water cooler at locations recommended by the cooler manufacturer.
12. Junction boxes and circuit distribution boxes shall be permanently marked with the circuit identification numbers of the circuits contained therein.
13. Junction boxes (above ceilings and exposed) for emergency circuits shall be color coded with color(s) not used for other systems.

14. Separate boxes to prevent sound transmission as follows:
  - a. In walls of adjoining rooms not requiring fire rating, minimum 8" horizontal separation.
  - b. In walls of adjoining rooms with fire rating, minimum 24" horizontal separation.
  - c. Back-to-back boxes shall not be used.
  - d. All raceway penetrations of rated walls and guest room walls shall be properly sealed.

B. FLOOR OUTLETS:

1. In slabs not on grade furnish and install smoke and fire rated assemblies with fittings and firestop with suitable material to meet all legal requirements for floor penetrations. Exception: For all floor wiring devices designated as flush, Contractor shall furnish and install flush cast iron floor boxes. Provide fireproofing at all penetrations through slab for floor boxes. All wiring devices shall be fully circuited and wired by this Contractor.
2. For on grade slabs, install cast iron or PVC floor boxes as specified herein. Exception: The floor box installed as a part of the column raceway system, as depicted in the standard details shall be as noted in the details.

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EOS

## SECTION 16140 - WIRING DEVICES

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: This section covers line voltage wiring devices.
- 1.02 SUBMITTALS: Submit shop drawings and/or manufacturer's catalog sheets for approval.

### PART 2 - PRODUCTS

#### 2.01 SWITCHES AND RECEPTACLES:

##### A. GENERAL:

1. All devices shall be specification grade, heavy duty, standard configuration for the purpose of application. It shall be the contractor's responsibility to provide all necessary accessories to make complete and functioning devices or outlets.
2. Where pilot light only indicated, provide a correct voltage red jewel neon light mounted in standard switch box. For switches with pilot light provide neon light in toggle handle. See below.

##### B. SWITCHES FOR LOCAL CONTROL: Shall be flush tumbler, quiet type, with screw type terminals.

1. Rated 120-277 volts, 20 AMPS, AC only, colored ivory, Bryant Type 4901.
2. Where indicated to have pilot light, each shall have a correct voltage red neon pilot light in Lexan handle. Toggle handle lights when load on.
3. Switches for direct control of single phase fractional HP motors, i.e. exhaust fans, shall be motor rated.

##### C. RECEPTACLES FOR CONVENIENCE OUTLETS: Shall be specification grade, heavy duty.

1. They shall be rated 125 VOLTS 15 AMPS AC grounding type in guest rooms, and 20 AMPS elsewhere.
2. They shall be colored ivory. Exceptions: Receptacles for emergency system outlets shall be colored red. Isolated ground receptacles shall be colored orange.

3. They shall be self-grounding type, 3 or more wires, single or duplex, as indicated with NEMA standard face slot configuration.
  4. They shall have screw type terminals only.
  5. Non-standard type outlets and special purpose power supply receptacles shall incorporate applicable requirements for the standard type and shall be as indicated.
  6. For each non-standard receptacle, including all twist-lock devices and power supply outlets installed, furnish one matching attachment plug and connect same to the cord of the associated equipment.
- D. PLATES FOR WALL MOUNTED DEVICES: Shall be selected as follows:
1. Plates for outlets shall be ivory.
  2. They shall have the correct shape opening.
  3. Material: Smooth plastic for lighting switches and single and duplex standard receptacles.
- E. MANUFACTURERS: Acceptable manufacturers for above specified devices are Arrow-Hart, General Electric, Hubbell, Pass and Seymour, Bryant, Eagle, or Leviton. Provide all devices by approved manufacturer.

## 2.02 DIMMING EQUIPMENT FOR INCANDESCENT SWITCHING:

- A. GENERAL: Shall be provided as follows:
1. Select the dimmer to match the total load served.
  2. Derate dimmers if they are ganged in common enclosure.
  3. Use only solid state electronic type dimmers in 600W, 1000W, 1500W, or 2000W rating, as manufactured by General Electric, Lutron, or approved equal.

## 2.03 PUSHBUTTON, BELL AND TRANSFORMER:

- A. Edwards catalog numbers 600, 55-6G5, and 88-50, or equal.

## 2.04 DEVICES FOR FLOOR BOX OUTLETS:

- A. COVERPLATES: Shall be configured as follows:

1. For Rectangular Cast Iron Floor Box

| <u>Type Cover</u>     | <u>Hubbell</u> | <u>Steel City</u> | <u>LEW</u> |
|-----------------------|----------------|-------------------|------------|
| Flush Cap Combination | S-2625         | P64-3/4-2         | 6203       |
| Flush Duplex Flap     | S-3825         | P64-DS            | 6304DFB-1  |

a. Rectangular Carpet Flanges

| <u>Vendor</u> | <u>1-gang</u> | <u>2-gang</u> | <u>3-gang</u> |
|---------------|---------------|---------------|---------------|
| Hubbell       | S-3083        | S-3084        | S-3085        |
| Steel City    | P64-LCP       | P64-2LCP      | P64-3LCP      |
| LEW           | CF-6261       | CF-1102-CP    | CF-1103-CP    |

2. For Round, Metal or PVC Floor Box (Single Service Only)

| <u>Type Cover</u>     | <u>Hubbell</u> | <u>Steel City</u> | <u>Walker</u> | <u>LEW</u> |
|-----------------------|----------------|-------------------|---------------|------------|
| Flush Cap Combination | S-2525<br>CACP | P60-3/4-2         | 896CK-3/4     | 524        |
| Flush Duplex Flap     | S-3925         | P60-CACP          | 895           | DFB-1      |
| Carpet Flange         | S-3082         | (N/A)             | (N/A)         | SCF-CP     |

3. For Hubbell round plastic floor box with low voltage divider use Hubbell no. SF39253 Brass 3 service cover with flange. Use PFBA1 adapter ring.

4. Above Floor Service Fittings

| <u>Vendor</u> | <u>1-Duplex<br/>Recept.</u> | <u>2-Duplex<br/>Recept.</u> | <u>Telephone/<br/>Comm.</u> |
|---------------|-----------------------------|-----------------------------|-----------------------------|
| Hubbell       | SC-3091                     | SC-3092                     | SC-3090                     |
| Steel City    | SFH-50-RG                   | SFH-50-2RG                  | SPH-50-Telecov              |
| Walker        | 513AL                       | 513D                        | 501                         |
| LEW (FDN-300) | 804                         | (2)804                      | 805                         |

B. OUTLET DEVICES:

1. Receptacles for power shall be as specified elsewhere in this section.
2. Coverplates for floor boxes with power receptacle shall be flush duplex flap as specified above.
3. Devices for communication outlets mounted in floor boxes are specified elsewhere in these specifications.

## PART 3 - EXECUTION

### 3.01 INSTALLATION:

#### A. GENERAL:

1. Install all devices indicated complete with cover plates.
2. Where necessary, set the long dimension of the plate horizontal, unless otherwise noted on contract drawings.
3. All 120V devices at a common location shall be "gang-mounted" under common cover.
4. All receptacles shall maintain a consistent orientation for neutral connection; use the silvered terminal if supplied with device.
5. Provide definite grounding method for all special outlets, including isolated ground devices and power supply receptacles.

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EOS

## SECTION 16160 - PANELBOARDS

### PART 1 - GENERAL

1.01 WORK DESCRIPTION: This section covers distribution and lighting and power panels.

A. WORK SPECIFIED ELSEWHERE: Refer to Section 16180 for overcurrent protective devices and Section 16010 for labeling.

1.02 SUBMITTALS: Submit shop drawings for approval.

### PART 2 - PRODUCTS

2.01 EQUIPMENT:

A. All equipment furnished under this section shall be in accordance with applicable NEMA standards.

B. PANELS:

1. Provide identification plate on face of each panelboard. Refer to Section 16010. Provide temporary identification as panels are installed.
2. Shall consist of completed dead-front assemblies including but not limited to the following:
  - a. Back Pan.
  - b. Bus Bars.
  - c. Sheet Metal Cabinet.
  - d. Switching and Over-Current Units.
  - e. Trim for Distribution Panels.
  - f. Trim and Door for Lighting and Miscellaneous Power Panels.
3. Sheet metal cabinets shall be minimum 20" wide fabricated from industry standard gauge galvanized sheet steel with corners lapped and fastened by approved methods. Provide minimum gutter space in accordance with the National Electric Code. Where feeder cables supplying the mains of a panel are carried through a panel, the carrying panel shall be sized to include the additional wiring space.

4. Trims and doors shall be suitable for the required mounting. When installed, the whole assembly shall present a smooth flush appearance. Provide combination catch and lock with 2 sets of keys. All panels within same facility shall be keyed alike. Mount a clear plastic cover and sleeve with a typewritten directory--identifying each circuit--inside of panel door. Trims shall be fastened with adjustable screw clamps and self-supporting on cabinets if screws are removed. Overlap flush cabinets at least 1/2" all around. Paint the inside and outside of trims and doors with factory applied rustproofing and one finished coat to which field applied paint will adhere.
5. Switching and over-current units shall be bolt-on (connection to bus) circuit breakers or fusible switches as specified in the appropriate section of these specifications. All lighting and appliance power panelboards with main circuit breaker shall have main circuit breaker at the top.
6. Bus bars for panels shall have current capacities as indicated and sized for such capacities in accordance with Underwriters' Laboratories standards to limit temperature rise on any current carrying part to a maximum of 50°C above an ambient of 40° maximum. The bussing shall be braced throughout to conform to industry standard practice. Phase bussing shall be full height and tapped for sequence phasing of the branch circuit devices. Full size neutral bus bar shall be included. Bussing in distribution panelboards shall have uniform capacity throughout.
  - a. Lighting and appliance power panels bussing shall be 98% copper.
  - b. All bussing to be bolted.
  - c. The voltage, number of phases and wires, size of main lug or main device (ampacity), number of branch circuit and their rating, and the number of spares and spaces are to be as noted on the contract drawings. Split bus panels where used are to be operated by 3-wire controlled contactor with capacity equal or greater than bus rating. A minimum of eight (8) common function branch circuits are required to justify the use of split bus panels for lighting control.
7. All 120/208V panels serving computer terminal receptacles to have isolated ground bus. Provide correct number, size and type of lugs or connectors for each phase bus, neutral bus, ground bus, main device and branch circuit. All panels shall be fully bussed.



C. LIGHTING PANELBOARDS:

1. Lighting and miscellaneous power panelboards shall be the types listed below manufactured:  
  
120/208 volt - Type "NLAB" as manufactured by General Electric Company  
  
120/208 volt - Type "NQOB" as manufactured by Square-D Company  
  
277/480 volt - Type "NHB" as manufactured by General Electric Company  
  
277/480 volt - Type "NEHB" or "I-Line" as manufactured by Square-D Company (as noted on drawings)
2. Branch circuit breaker locking devices (lock dogs) shall be installed as indicated on panelboard schedules.
3. Provide a Micarta laminated identification nameplate for each panelboard.
4. Other acceptable panelboard manufacturers are Square-D Company, Westinghouse and ITE.
5. Housing for all distribution, lighting and appliance panelboards shall be NEMA 1 rated, except for those panelboards in the mechanical equipment room which shall be NEMA 3R.

D. DISTRIBUTION PANELBOARDS:

1. Bussing shall be 98% copper or tin plated aluminum. Bus bars for distribution panels shall have current capacities as indicated on attached schedule and sized for such capacities in accordance with Underwriters' Laboratories standards. Bussing shall be braced throughout to conform to industry standard practice. Phase bussing shall be full height and arranged for sequence phasing (A-B-C top-to-bottom, Left-to-right and front-to-back) of branch switch devices. Provide correct number, size and type of lugs or connectors for each phase bus, neutral bar, ground bar, and branch circuit devices. The bus structure shall accommodate plug-on branch fusible switches or bolt-on branch circuit breakers if the distribution board is not fusible.

2. All fusible branch switches of fusible distribution boards shall be quick-make, quick-break type with visible blades and dual horsepower ratings. Switch handles shall physically indicate "ON" and "OFF" positions. Switches shall be lockable only in the "OFF" position and accept industrial type heavy duty padlock. Switch covers and handles shall be interlocked to prevent opening in the "ON" position. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes.
3. All circuit breaker branches contained in circuit breaker distribution boards shall be molded case type as specified in Section 16180 of these Specifications.
4. Distribution panel shall be listed by Underwriters' Laboratories and shall bear the U.L. label.
5. Distribution Panels shall be Square-D Company "QMB" fusible type or Square-D Company "I-Line" circuit breaker type (when indicated). Westinghouse Type "FDP" and "CDP" Distribution Panels are acceptable.
6. Acceptable Distribution Panelboard manufacturers are General Electric, Square-D Company, Westinghouse and ITE.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

##### A. GENERAL:

1. Install panels with adequate support independent of the connecting raceways.
2. Mount all panels level and plumb. Flush panels not to extend beyond the face of the wall. All trim around panels shall be furnished and installed by Electrical Contractor.
3. Protect panels during construction with adequate covering.
4. Insulate flush mounted panels in exterior walls with 1/4" solid insulation board between back of cabinet and wall. Surface mounted panels installed directly on exterior masonry block wall shall have a 1/4" solid insulation board between back of cabinet and wall or panels shall be mounted in such a manner to provide a minimum of 1/2" air gap between back of panel and exterior wall.

5. Provide flush mounted panels with empty 1-1/4" conduit terminating in a junction box in the hung ceiling of the floor where it is mounted and also, in the hung ceiling in the floor below.
6. All overcurrent devices shall be labeled to accommodate 75°C. insulated conductors. Labels shall appear on the overcurrent devices as well as on the enclosures.

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EOS

## SECTION 16170 - DISCONNECTS

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: This section covers individually mounted disconnect switch devices.
- 1.02 SUBMITTALS: Submit shop drawings for approval.

### PART 2 - PRODUCTS

#### 2.01 MATERIAL:

##### A. GENERAL:

1. Disconnect switches shall be general duty with quick-make, quick-break (QMQB) mechanism.
2. They shall have NEMA type enclosures as required and/or noted on the contract drawings with nameplates with a permanent record of type, size and horse-power ratings.
3. They shall have operating handles with definite "OFF" indications and defeatable door interlocks in the "ON" position.
4. Provide switch assembly, where the operating handle is an integral part of the enclosure base.
5. Fused disconnects shall have reinforced fuse clips for both standard and time delay fuses.
6. Provide multi-padlock capability for the operating handle.
7. Provide six pole disconnects where required for six lead motors.

##### B. MANUFACTURERS: Cutler-Hammer, General Electric, Siemens/ITE, Square D, and Westinghouse.

##### C. Overcurrent protective devices shall be in accordance with Section 16180 of these specifications.

## PART 3 - EXECUTION

### 3.01 INSTALLATION:

- A. GENERAL: Refer to Section 16010 for labeling requirements.
1. All disconnects shall have nameplates identifying load being served.
  2. Install fused or non-fused disconnect switches where indicated on the contract drawings or required by latest NEC or governing authorities.
  3. They shall be installed with adequate hand access to and clearance for operation and fuse replacement.

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EOS

## SECTION 16180 - OVER-CURRENT PROTECTING DEVICES

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: This section covers circuit breakers, fuses and all over-current protecting devices.
- 1.02 SUBMITTALS: Submit shop drawings for approval.

### PART 2 - PRODUCTS

- 2.01 MATERIALS:
- A. OVER-CURRENT DEVICES: Shall be labeled to accommodate 75°C insulated conductors. Labels shall appear on the overcurrent devices as well as on the enclosures. All items under this section shall conform to applicable NEMA and ANSI Standards.
  - B. CIRCUIT BREAKERS:
    - 1. Circuit breakers shall be molded case, completely enclosed bolted connection devices.
    - 2. They shall be quick-make, quick-break, trip free, trip indicating one-, 2- or 3-pole switching units.
    - 3. All multi-pole breakers shall have common trip handles and all poles shall close, open or trip simultaneously.
    - 4. They shall provide inverse time delay overload with instantaneous short circuit protection by means of a thermal-magnetic element.
    - 5. AIC Rating: 120V and 208-240V breakers, minimum 10,000 AIC. 277V and 480V breakers, minimum 14,000 AIC. Series rating of breakers will not be allowed.
    - 6. They shall be rated to withstand the available short circuit current at the line side of connection.
    - 7. They shall be provided with non-welding contact surfaces and arc chutes.

C. FUSES:

1. Fuses 600V or less shall be cartridge type and shall be non-renewable.
2. Provide current limiting fuses, time delay or fast acting in accordance with drawings and diagrams. Main switchboard fuses: Bussman KRP-C for main interrupters and Bussman LPS-RK for distribution feeder switches.
3. Provide dual element, time delay fuses for motor feeders or branch circuits of motors larger than 1/2 HP. Use Buss LPS-RK, FRS-R (600V); LPN-RK, FRN-R (250V) for loads up to and including 600A and Buss KRP-C (600V) for loads above 600A. Refer to drawings for specific applications.
4. Provide proper type and size fuses for all fusible devices, including equipment furnished by owner. When selecting fuses, follow the recommendation of the protected equipment manufacturer.
5. Provide 10% spare fuses, with a minimum of 3 for each size and type, of each size and type fuse used on this facility. Deliver fuses to the owner's representative and provide a spare fuse cabinet on the HVAC Equipment Room Wall as shown.
6. Fuses above 600V shall be the type recommended for the equipment by the manufacturer and acceptable to the local utility company. Provide 3 spares of each such type and size of fuse installed.
7. Fuses shall be manufactured by Bussman, Shawmut or Littlefuse.

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EOS

## 16420 - ELECTRICAL SERVICE ENTRANCE

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: This section covers the electrical service to the building.
- 1.02 SUBMITTALS: Submit shop drawings for approval where noted.
- 1.03 QUALITY ASSURANCE:
- 1.04 WORK DESCRIBED ELSEWHERE: "Raceways" Section 16110, "Conductors" Section 16120.
  - A. GENERAL:
    - 1. The permanent electrical supply for the project will be provided the local public utility company, Entergy Corp. of Mississippi.
    - 2. File all applications necessary for the above - within adequate time - before permanent service is required.
    - 3. Responsibility for the payment of any "non-recoverable" cost shall be included in the electric work. This includes cost differences for underground versus overhead primary distribution systems.
  - B. Provide all primary/secondary conduits and concrete pad in accordance with utility company requirements. Contractor shall pay for underground service conductors as required. .

### PART 2 - PRODUCTS

- 2.01 MATERIALS:
  - A. SECONDARY SERVICE ENTRANCE: Shall be conduit and cable. Conduit shall be concrete encased (Minimum 3" all around) where the length of the conduit from building exterior to the service transformer pad exceeds 15'-0". Concrete shall be colored with red dye.
    - 1. Provide cable limiters where required.
    - 2. Service entrance cable conductors shall be copper. Aluminum is acceptable only if required by the local utility company. Maximum size of service entrance cable conductors is 750MCM. Full size neutrals shall be provided.
    - 3. Ground conductors shall be sized per NEC 250-94.



- B. CONDUIT: Shall be PVC Schedule 40 per Section 16110 of these specifications. Schedule 80 PVC is acceptable if required by the local utility company. Conduits entering the building (penetrating exterior wall or stub-up through slab) must be rigid steel. Provide appropriate flexible, waterproof couplings for penetrating exterior wall. Provide one empty service entrance conduit (for dual transformer configuration provide one empty service conduit from each transformer).
1. Provide proper floor and/or sleeves and glands for conduit.
  2. Where metallic conduit is required or used, it shall be rigid steel and shall be painted with bituminous paint.
- C. LIGHTNING SURGE ARRESTERS:
1. Lightning surge arrester must be included in the main switchboard where the utility does not provide arrester on primary side of service transformer or at on site primary switchgear.
  2. Arrester are to be factory installed in main switchboard.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

A. GENERAL:

1. Install all equipment in accordance with the local utility company requirements.
2. Coordinate the service entrance installation with the power company's service department.
3. Provide appropriate sealing of all conduits and cables to prevent any water from entering the building and/or equipment. Where conduits enter the main switchboard room, install additional method to prevent moisture/water from entering the main switchboard through the conduits.
4. Provide all equipment necessary for the metering and insure the proper installation of the utility company's CT's.
5. When penetrating a foundation wall above the first floor slab, provide a gland type conduit sleeve.

6. Verify final location of metering equipment prior to completion of service entrance work.
7. Coordinate arrester location with utility representative.

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EOS

## SECTION 16450 - GROUNDING

### PART 1 - GENERAL

- 1.01 WORK DESCRIPTION: All electrical systems shall be grounded in accordance with the National Electrical Code, Local Codes, these specifications and the contract drawings.
- 1.02 WORK DESCRIBED ELSEWHERE: "Conductors" section 16120.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

##### A. GENERAL:

1. Use green colored and coded insulated copper conductors.
2. Use approved ground clamp manufactured for such purpose.
3. Use approved grounding electrodes and rod.
4. Make all conductor to conductor, conductor to ground rod and conductor to steel grounds connections with approved exothermic welding method.
5. Ground rods: 5/8" diameter copper clad steel, minimum ten feet in length.

#### 2.02 APPROVED MANUFACTURERS:

##### A. Approved manufacturers for exothermic welding process are as follows:

1. CADWELD

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

##### A. GENERAL:

1. Ground all systems and equipment with the best applicable industry practice.
2. Building steel shall be grounded in the area of main switchboard, and electric closets. A total of 15% of all steel columns shall be grounded through a driven ground rod system, #1/0 AWG cu. stranded conductor shall connect the rod to the steel columns.

3. Utilize the main water service pipe only if it is metallic type, minimum of 100' buried and the grounding effectiveness is established.
4. The point of connection to the service shall be as near to the water meter as possible.
5. Provide copper wire shunt at the street side of the water meter and/or main shut-off valve.
6. Where the domestic water service is non-metallic, installed with the use of insulated couplings, or installed in such a manner to negate the effectiveness of the ground, a supplemental ground shall be installed. The installation shall be as per contract drawings.
7. Install metallic raceways mechanically and electrically secure at all joints and at all boxes, cabinets, fittings and equipment. At the point of electrical service entrance, bond all metallic raceways together, with a ground conductor, and connect to the system ground bus. Bond all boxes as specified for equipment.
8. Provide separate green equipment ground conductor in all non-metallic, electrical raceways, to effectively ground all fixtures, panels, controls, motors, disconnect switches, exterior lighting standards, and non-current carrying metallic enclosure. Use bonding jumpers, grounding bushings, lugs, busses, etc., for this purpose.
9. Connect the equipment ground to the building system ground. Use the same size equipment ground conductors as phase conductors, up through No. 10 AWG. Use NEC Table 250-95 for conductor size with phase conductors No. 8 and larger, if not shown on the contract drawings.
10. Permanently connect the green ground conductor to each receptacle junction box (self-tapping screw).
11. Connect the ground conductor to the conduit with an approved grounding bushing, and to the metal frame with a bolted solderless lug. Bolts, screws and washers shall be bronze or cadmium-plated steel.
12. Provide a flexible ground strap, No. 6 AWG equivalent, at each flexible duct connection at each air handler, exhaust fan, and supply fan, and install to preclude vibration.
13. Provide one No. 6 TW copper wire in 1/2" conduit from the main telephone cabinet to the street side of the domestic water service (street side of water meter) or building ground connection.

14. Concrete encased rods or wires in foundations and footings with adequate electrical connections from each main reinforcing member to structural steel may be used, providing soil conditions are not restrictive and the net ground resistance is acceptable.
15. Provide separate grounding conductor in all feeders to 480V distribution panelboard feeders. Size of ground to be per NEC table 250-95.
16. Isolated ground is derived from the grounded Xo terminal of the secondary of a stepdown transformer. A separate insulated conductor(s) shall connect the Xo terminal to the isolated ground bar in panelboard(s) requiring isolated ground provisions. No portion of any isolated ground system shall be used to provide ground for any raceway and/or equipment.
17. At indoor pool and spa, ground rods shall be driven and connected to pool reinforcing steel rods, pool rails, ladders, diving boards and pool pump.
18. Provide isolated ground for Property Management Services outlets and telephone service equipment.

B. SERVICE ENTRANCE:

1. Where the primary grounding electrode is not a metallic water service pipe utilize a made electrode system.
2. The service entrance shall be grounded at the transformer (outside the building) per Utility Co. requirements as well as at the switchboard ground bus.

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EOS

## SECTION 16500 - LIGHTING

### PART 1 - GENERAL

#### 1.01 WORK DESCRIPTION:

- A. WORK INCLUDED: This section includes indoor and outdoor lighting fixtures and associated supports and lenses.

#### 1.02 SUBMITTALS: Submit shop drawings for approval.

#### 1.03 RESPONSIBILITY:

- A. LIGHTING FIXTURES: All lighting fixtures and lamps shall be furnished and installed under the General Contract. Only lighting fixtures as indicated on the Lighting Fixture Schedule modified to satisfy local codes and ordinances, if required, and as manufactured by the "Approved Manufacturers" shall be accepted.
  - 1. Even though a manufacturers catalog and/or drawing number is listed on the lighting fixture details, it shall be this Contractor's responsibility to furnish all required accessories or modifications to meet the specification requirements for lighting fixtures. This Contractor shall be responsible for verifying voltage requirements of fluorescent/HID lighting fixtures prior to ordering and, where required for plaster/gypboard ceiling, to order frames and/or modifications to fixtures.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

- A. FIXTURES, GENERAL: Comply with the requirements specified below and lighting fixture schedule on the drawings.
  - 1. Comply with Underwriters' Laboratories requirements. Lighting fixtures shall be listed and bear the U.L. label.
  - 2. Comply with local building and electrical codes.
- B. FIXTURE COMPONENTS, GENERAL: Furnish fixtures complete with all required accessories, components and hangers.
  - 1. Metal parts shall be free from burrs and sharp corners and edges.

2. Sheet metal components shall be steel except as noted otherwise. Components shall be formed and supported to prevent warping and sagging. Pre-painted steel, before forming, shall not be used.
  3. Doors, frames, and other internal access pieces shall be smooth operating and free from light leakage under operating conditions. Relamping shall not require use of tools. Doors, frames, lenses, diffusers, louvers, and other pieces shall be designed to prevent accidental falling during relamping and when secured in the operating position.
  4. Suspended Fixture Support Components:
    - a. Single stem hangers: 1/2 inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
    - b. Rod hangers: 3/16 inch diameter steel rod, threaded and rust inhibited.
    - c. Chain: 150 lb. rating. Use same gauge steel "s" hooks for attachment to fixture.
  5. Sockets:
    - a. All fluorescent sockets shall be held rigidly in place and shall contain spring brass contacts.
    - b. Screw sockets shall be nickel-plated brass with a porcelain envelope.
    - c. Mogul sockets shall have internal spring grips and a porcelain envelope.
  6. Housings: Unless noted otherwise shall be of heavy gauge steel (CRS) and shall be formed so as to preclude sag, distortion, or "oil canning".
    - a. Spun housings shall be brushed to remove tool marks.
    - b. Pre-painted steel, before forming, shall not be used.
- C. FLUORESCENT BALLASTS: Each fluorescent lighting fixture shall contain a single ballast (4 lamp T12 fixtures shall contain two (2) ballasts) compatible with and designated for use with the specified lamps.
1. Ballasts shall bear the "CBM certified by ETL" label and conform to the applicable requirements of U.L. Ballasts must be U.L. listed for use with reduces wattage lamps.

2. Ballasts shall be class P (contain internal thermal protection) and have a sound rating of "A".
3. Ballasts shall be high power factor type. Electronic ballast shall have a ballast factor greater than 0.85.
4. Ballast for fixtures used in exterior canopies or other outside locations shall be rated for low temperature conditions.
5. Furnish ballasts with input voltage rating in accordance with drawings/fixture schedule.
6. Ballasts shall be warranted for a minimum of three (3) years.
7. Approved Ballasts and Manufacturers:
  - a. One (1) and two (2) lamp F20T12: Advance, Universal, or Valmont.
  - b. Electronic one (1) and two (2) lamp F40RS: Advance, Magnetek-Triad, Motorola, or Valmont.
  - c. Optimiser one (1) and two (2) lamp F40RS: Valmont
  - d. Electronic three (3) lamp F40RS: Advance, Magnetek-Triad, Motorola, or Valmont.
  - e. Electronic two (2) lamp and three (3) lamp F40BX (biac): Magnetek-Triad.
  - f. Electronic two (2), three (3) and four (4) lamp F032T8: Magnetek-Triad, Motorola, or Valmont.
  - g. Compact fluorescent: Advance, Magnetek-Triad, or Valmont.

D. HID BALLASTS: Each HID lighting fixture shall contain a single ballast compatible with and designated for use with the specified lamps.

1. Ballasts shall be high power factor constant wattage type and when subjected to plus or minus 10% line voltage variation will produce plus or minus 5% lamp output.
2. Metal halide ballasts shall be of the lead type.



3. Each ballast shall be fused (double fusing on 208V and 480V units).
4. Ballasts shall have a maximum crest factor of 2.0 at the rated voltage.
5. Laminations shall be welded. Capacitor terminals shall be covered by suitable insulating sleeves or boots.
6. Outdoor ballast
  - a. Provide reliable starting to -20°F. Indoor ballasts shall be rated for 55°C ambient.
  - b. Ballast capacitor shall be compatible with these ambient temperature ratings.
7. Furnish ballast with input voltage rating in accordance with drawings/fixture schedule.
8. Ballast shall be warranted for a minimum of three (3) years.

E. FLUORESCENT FIXTURES: Ballast(s) as specified above.

1. Conform to UL1570, "Fluorescent Lighting Fixtures".
2. Recessed 2' X 2' (nominal) and 2' X 4' (nominal) fixtures shall be fitted for flush mounting in an exposed tee 2' X 4' suspended acoustic tile ceiling (2' X 2' fixtures in 2' X 2' ceilings) or for flush mounting in a gypboard/plaster ceiling.
  - a. Fixture shall have integral ballast(s) and shall be factory pre-wired, fully assembled, and ready for installation when shipped from factory.
  - b. Housing shall be rigidly die-formed and embossed of 22 gauge min. C.R.S. with all fastenings and attachments by means of spot welds, sheet metal screws or pop rivets. 2' X 4' fixtures shall be formed in at least three (3) planes on the two (2) four (4) ft. length bottom edges for rigidity and surface to surface contact on the ceiling tees. Alternately, housings of 20 gauge C.R.S. may have bottom edges formed on two (2) planes on the four (4) sides. 2' X 2' fixtures shall be formed on the four (4) bottom edges for rigidity and surface to surface contact on the ceiling tees. Housing shall provide for mounting of the ballast cover, ballasts, and door frame. Housing shall have a minimum of two (2) 7/8" diam. KO's (knockouts) in the top and a minimum of one (1) 7/8" dia. KO in

each end. Housing shall be fitted with four (4) spring steel safety clips, two (2) each on opposite sides, to securely engage the heads of the ceiling tees. Safety clips shall have a rigid return with one (1) drilled 3/16" dia. hole each for attachment of safety cable. Housing exterior shall be finished with white enamel, baked on. Housing of fixtures installed in gypboard/plaster ceilings shall have integral gypboard/plaster mounting frame.

- c. Ballast covers shall be rigidly formed of C.R.S. and shall be removable from below within the lighting fixture to allow access to ballast and wiring.
  - d. Ballast(s) shall be mounted on flat surface and shall be secured in place by at least two (2) fasteners, one (1) at each end of the ballast.
  - e. Door frames for lensed fixtures shall be rigidly formed of 20 gauge min. C.R.S. with mitered corners without light leaks or visible fasteners. Door frames shall be mounted to the housing with concealed hinges, be capable of attachment to either side of the fixture, and removable without the use of tools. Door frame shall be designed to accept the lens specified. Door frame shall have continuous gasketing on all four (4) sides to eliminate light leaks or the door frame/housing fit shall be configured to provide a three (3) right angle light trap. Door frame shall permit field replacement of lens.
  - f. Lenses shall be 100% virgin acrylic plastic with a minimum thickness of 0.140 in. Pattern shall be pyramidal base female prisms in a square array.
  - g. Parabolic louver assembly for louvered door fixtures shall be 4" deep, 9 cell, formed from 0.025" nominal coil alzak aluminum and interlocked to provide rigidity and to avoid vibration. Louver shall be semi-specular, natural finish, and treated with iridescent inhibiting process. Louver assembly shall be designed so it can be hinged and latched from either side of fixture. Latches shall be positive spring or cam lock type. Latch finish for fixtures with black regress shall be black. Latch finish for fixtures without regress shall be natural aluminum.
  - h. Parts not specifically identified in this specification shall be made of materials most appropriate to their function.
3. Surface or pendent mounted and suspended lighting fixtures shall be bare, with or without reflectors, or have plastic wrap lens.

- a. Fixture shall have integral ballast(s) and shall be factory pre-wired and ready for installation when shipped from factory.
  - b. Housing shall be rigidly die-formed of heavy gauge steel with all attachments by means of spot welds, sheet metal screws, or pop rivets. Housing shall be formed for rigidity and shall provide for mounting of the ballast and, as required, ballast cover, reflector, or lens. Lensed fixture shall have endplates rigidly attached. Endplates shall be designed for fit to louver to prevent light leakage.
  - c. Ballast cover shall be formed of steel and on bare strip fixtures shall be secured in place by sheet metal screws or quarter-turn fasteners.
  - d. Reflectors for bare strip fixtures shall be die-formed of steel. Bottom edge of reflector shall be rolled. Reflectors shall be attached to housing by means of sheet metal screws or quarter-turn fasteners.
  - e. Wrap around lens shall be virgin acrylic. Color shall be white or opal for single lamp fixtures and clear for double lamp fixtures. Minimum thickness lens is 0.125 inches.
  - f. Parts not specifically identified in this specification shall be made of materials most appropriate for their function.
4. Recessed round fluorescent fixtures: Compact fluorescent lamp type.
- a. Fixture shall have ballast mounted in compartment attached to fixture and shall be factory pre-wired.
  - b. Fixture shall be rough-in/finish sections designed consisting of frame unit and finish unit. Finish unit electrically connects to rough-in unit using quick connect plugs.
  - c. Trim ring shall be 22 gauge steel with white baked enamel finish.
  - d. Reflector shall be low-brightness, "iridescence inhibited", alzak aluminum photometrically designed for use with compact fluorescent lamps.
  - e. Fixture shall include 28" hanger bars as a part of rough-in section.

- f. Ballast shall be high power factor type. Refer to paragraph C of this specification section.
- g. Parts not specifically identified in this specification shall be made of materials most appropriate to their function.

F. INCANDESCENT FIXTURES:

- 1. Conform to UL1571, "Incandescent Lighting Fixtures".
- 2. Recessed fixtures shall, when installed, have trim ring flush with ceiling.
- 3. Trim ring shall be metallic and shall be finished white with baked-on enamel.
- 4. Recessed housings shall be steel and finished black, both inside and out.
- 5. Fixed downlight fixtures shall have regressed ridged baffle.
- 6. Sockets shall be as specified elsewhere in this section.
- 7. Parts not specifically identified in this specification shall be made of material most appropriate for their function.

G. TRACK LIGHTING FIXTURES:

- 1. Conform to UL1574 "Track Lighting Systems".
- 2. Provide components, including track, fittings, and fixtures from same manufacturer.
- 3. Housing shall be constructed using spun technique.

H. HID FIXTURES: Conform to UL1029 "High-Intensity-Discharge Lamp Ballast" and ANSI C82.4.

- 1. Ballasts
  - a. Constant wattage autotransformer (CWA) or regulator, high power factor type:
  - b. Furnish ballast with input voltage ratings per lighting fixtures schedule on drawings.

- c. Minimum starting temperature of minus 30°C. Normal ambient operating temperature is 40°C.
  - d. Open circuit operation will not reduce average life.
  - e. High pressure sodium (HPS) ballast shall incorporate a solid state ignitor/starter with average life in pulsing mode of 10,000 hrs. at an ignitor/starter case temperature of 90°C.
  - f. Metal Halide ballast shall have manufacturer's standard epoxy encapsulated model designed to minimize audible fixture noise.
  - g. Metal Halide fixtures used for emergency lighting functions shall contain an auxiliary instant-on, quartz system. Quartz incandescent automatically switches on when fixture is initially energized and when momentary power outages occur. Turns off quartz lamp automatically when HID lamp reaches approximately 60% light output. Ballast to have internal components independent of incoming line voltages.
- 2. Trim ring shall be steel painted with color specified elsewhere.
  - 3. Reflector for metal halide fixture must give photometric performance using clear lamp.

I. FINISHES:

- 1. Fluorescent fixtures: All housing, door frames, ballast covers, and all other reflective surfaces shall be painted after fabrication with baked-on white enamel with a minimum reflectance of 89%.
- 2. All aluminum louver for fluorescent fixtures shall have iridescent inhibiting process treatment.

J. WIRING: All internal wiring shall be copper, 600 volt, temperature rated per U.L. standards.

- 1. Conform to local codes and ordinances.
- 2. Incandescent sockets shall be wired with high temperature wire per requirements of U.L. Internal wires (within fixture housing) shall be protected by braided sleeve. Auxiliary J-box shall be pre-wired and U.L. approved for 60°C supply wires.

3. Fluorescent fixtures shall have internal wiring sized not less than 18 gauge with thermoplastic insulation type required for U.L. listing and local codes and ordinances. Wiring connections within the wireway for stranded conductors shall be made using fully insulated, compression type, copper connectors. "Wirenuts" shall only be used with solid conductors.
- K. GASKETS: Shall be of a closed cell material suitable for the applicable temperature and proposed environment. No gasket material shall be used which shall age, harden or permanently deform under pressure.
- L. ACCESSORIES: All fixtures shall include plaster frames, trims, yokes, lenses in place, and all other appurtenances necessary to affect a complete installation. All fixtures shall be fabricated in a neat and workmanlike manner and shall conform to industry standards with regard to modularity, length and overall size.
- M. LABELS: Label stating fixture type number and manufacturer name shall be placed in a conspicuous location on the exterior of the luminaire. Label stating voltage and maximum wattage shall be placed on the interior if incandescent fixtures.
- N. OUTDOOR FIXTURES: Lighting and/or components of lighting fixtures which are exposed to the weather, shall be constructed of anodized aluminum or stainless steel.
1. Lighting fixtures and/or components not directly exposed to the weather, such as under extended canopies, may be constructed of steel with 2 coats of zinc chromate prime before application of the final finish.
- O. LAMPS PROVIDED: Shall be manufactured by General Electric, Philips, Sylvania or Venture in conformance with the lighting fixture schedule noted on the drawings.
- P. EMERGENCY FLUORESCENT POWER SUPPLY: Fixture designated to provide illumination at loss of power when there is no emergency generator.
1. Conform to UL924, "Emergency Lighting and Power Equipment".
  2. Fixtures shall have self-contained, modular, battery-inverter unit factory-mounted within the fixture body.
    - a. Test Switch and LED Indicator Light: Visible and accessible without opening fixture or entering ceiling.
    - b. Battery shall be sealed, maintenance-free, nickel-cadmium type, with a minimum nominal 10 year life.

- c. Charger shall be fully automatic, solid state, constant current type.
  - d. Operation: Automatically turns 1 lamp on when supply circuit voltage drops below 80% of nominal.
- Q. EXIT SIGNS: Conform to UL924, "Emergency Lighting and Power Equipment. U.L. label shall be affixed.
- 1. Sign colors: Letters shall be red unless required otherwise by local code.
  - 2. Minimum height of letters shall be 6" unless required otherwise by local code.
  - 3. Stencil face shall consist of a brushed (Satin finish) aluminum faceplate with letters backed with break resistant translucent plastic. Include arrows as indicated from Plans.
  - 4. Lamps for AC operation shall be two (2) each compact fluorescent with minimum 10,000 hrs. rated life. Lamps for DC operation shall have 50,000 hrs. rated life.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

##### A. GENERAL:

- 1. Where surface mounted fixtures are indicated for installation on low-density cellulose fiberboard, provide 1-1/2" ceiling spacers, unless U.L. approved for mounting directly to the ceiling material.
- 2. Provide plaster frames for all recessed lighting fixtures installed in gypboard/plaster ceilings unless otherwise approved by the Architect. Provide plaster frame designed and fabricated of such material to preclude the possibility of staining the plaster.
- 3. Properly support and align fixtures and provide all necessary steel shapes for support of the fixtures. Where local codes or ordinances require, provide independent support for each fixture. Coordinate complete fixture installation with the building construction.
- 4. Lighting fixture enclosures in fire rated ceilings shall conform to U.L. and lighting fixture manufacturers' requirements.

5. Square and rectangular fixtures shall be mounted with sides parallel to building lines, and parallel with ceiling lines.
6. Verify all ceiling systems and coordinate fixture type and accessories prior to ordering fixtures. Coordinate and cooperate with ceiling supplier in the preparation of ceiling shop drawings.
7. Install fluorescent fixtures as recommended by the manufacturer or as necessary to provide exact horizontal alignment, preventing horizontal or vertical deflection or angular jointing of fixtures suspended in continuous rows.

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EOS



## SECTION 16530 - SITE LIGHTING SYSTEM

### PART 1 - GENERAL

#### 1.01 WORK DESCRIPTION:

- A. This section covers outdoor site lighting fixtures and associated poles, lamps, supports and lenses.
- B. Criteria used for design and layout of site lighting system shall be as follows:  
  
Site Lighting System shall be accomplished with I.E.S. Type V luminaires mounted on 30 foot poles.
- C. Concrete reinforced pedestals shall be the responsibility of the electrical contractor.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

- A. All lighting fixtures and associated electrical components shall meet Underwriters' Laboratories requirements. Lighting fixtures shall comply with the Local Building and Electrical Code requirements.
- B. POLES:
  - 1. Pole shafts shall be one piece, round or square, tapered and fabricated of mild commercial steel plate or tubing. The shaft design shall be capable of supporting two luminaires of the types described herein under pressures generated by 100 mile per hour wind force with 125 mile per hour wind gust force.
  - 2. Allowable working stresses for the pole design shall be calculated in accordance with the current edition of "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
  - 3. Poles shall have pole top tenons capable of receiving a luminaire supporting bracket arm assembly.
  - 4. All dimensions of the pole, base plate, material thickness, and welding information shall appear on the shop drawings.

5. The base plate shall be continuously welded to the bottom of the pole shaft and drilled to accept a minimum of four anchor bolts, sized as indicated on the concrete base design.
6. Anchor bolts shall extend approximately 5" above the concrete base and shall be threaded for approximately 4 inches. The anchor bolts shall have double nuts to be used as leveling devices. Nut covers shall be provided for each bolt to prevent tampering.
7. Weep holes shall be provided in the base of the pole shaft to prevent any accumulation of water.
8. The pole base shall contain a hand hole sufficiently large to allow inspection of splices, ground connections, fuse replacement, and the ability to re-pull circuitry between poles. A ground pad shall be welded inside the pole, ground smooth and tapped to receive a 1/4-20 threaded bolt, for lugged connection to ground rod and conduit grounding bushings.

C. SITE LIGHTING LUMINAIRES:

1. Luminaires shall be designed with an overall cubic appearance having slip fitters which securely mates with the luminaire support bracket described above. Luminaires shall be completely weatherproof having shielded weep holes and shall permit ready access to lamp, ballast and all other auxiliary assemblies from below through the operation of a series of latches.
2. Hinged door gasketing shall be provided which allows breathing when luminaire heats up and cools down.
3. The lens shall be heat and shock resistant tempered glass, completely framed and gasketed. The lens shall be convex.
4. The lamp socket shall be porcelain, having no current carrying screws, with integral lamp grip. Lamp socket shall have an extruded housing with fins for cooling.
5. The reflector shall be fabricated from multiple pieces of specular Alzak aluminum. The reflector shall be securely mounted and totally enclosed by the luminaire housing and lens. The lens and reflector, in conjunction with the HID lamp source, shall produce a square Type VR lighting pattern.
6. Ballast shall be premium constant wattage auto regulated type for use with metal halide lamp. Ballasts shall be serviceable with the luminaire remaining in-place. Ballast shall serve only one lamp, have a power factor

in excess of 90%, regulate the lamp wattage within 15% for a 10% line voltage variation and be suitable for 208 volt primary operation. Ballast shall operate lamps properly at temperatures down to -20° F.

D. LAMPS:

1. Lamps for the site lighting luminaires on this project shall be 400 watt, 40,000 lumen output, clear, metal halide unless noted otherwise. Lamp shall be manufactured by General Electric and furnished and installed in the luminaires by the Electrical Contractor. Approved lamps by Sylvania are acceptable.

E. SITE LIGHTING SYSTEM CONTROLS:

1. Site lighting luminaires shall be controlled On/Off by photocell as darkness and dawn occur. An overriding manual switch will turn site lighting "OFF" at the discretion of the Owner.
2. Electrical Contractor shall be responsible for furnishing magnetic contactors for control of the site lighting.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Verify that tamperproof nut caps are installed. All lighting standards shall be erected plumb with a survey transit.

Pole leveling shall be accomplished with double nuts furnished with each anchor bolt.

Concrete grout shall be installed beneath the lighting standard base plate.

Lighting standards bent or dented during transit to jobsite shall be replaced.

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EOS

## SECTION 16720 - FIRE ALARM, WATER FLOW AND SMOKE DETECTION SYSTEM

### PART 1 - GENERAL

#### 1.01 SCOPE:

- A. This section specifies the requirements for furnishing and installing fire alarm, water flow and smoke detection systems for the facility.

#### 1.02 RELATED SECTIONS:

- A. Division 15 - Mechanical:
  - 1. 15150 - Sprinkler Equipment
- B. Division 16 - Electrical:
  - 1. 16110 - Raceways
  - 2. 16120 - Conductors

#### 1.03 REFERENCES:

- A. NFPA 72A - Installation, Maintenance and Use of Local Protective Signaling System for Guard's Tour, Fire Alarm and Supervisory Service.
- B. NFPA 72B - Installation, Maintenance and Use of Auxiliary Protective Signaling System for Fire Alarm Service.
- C. NFPA 72C - Installation, Maintenance and use of Remote Station Protective Signalling System.
- D. NFPA 72E - Automatic Fire Detectors.
- E. NFPA 72G - Notification Appliances for Protective Signaling Systems.
- F. NFPA 72H - Guide for Test Procedures for Protective Signaling System.
- G. NFPA 101 - Life Safety Code.
- H. NEC Article 760 - Fire Protective Signaling Systems.
- I. Title III of the Americans with Disabilities Act (ADA)

#### 1.04 REGULATORY REQUIREMENTS:

- A. System: U.L. and FM listed.
- B. Conform to requirements of NFPA 101
- C. Conform to applicable local ordinances.
- D. Where required, Contractor shall be currently licensed, by authority having jurisdiction over job site, to work on Fire Alarm Systems. Applicable state license number shall be annotated on all correspondence and drawings.
- E. Conform to all requirements of Title III of the Americans with Disabilities Act (ADA).

1.05 SYSTEM DESCRIPTION:

- A. Fire Alarm System: NFPA 72A; manual fire alarm system.
- B. System Supervision: Provide electrically-supervised Class B System, with supervised alarm initiating and alarm signaling circuits. Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode. Component or power supply failure places system in TROUBLE mode.
- C. Water Flow Alarm Sequence of Operation: Actuation of water flow switch device causes system to enter ALARM, which includes each of the following operations:
  - 1. Sound and display local fire alarm signaling devices with non-coded signal.
  - 2. Indicate initiation of alarm on fire alarm control panel.
- D. Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM, if alarm initiating circuits have cleared.
- E. Trouble Alarm Sequence of Operation: System trouble signal to be initiated by smoke detection, valve tamper detection, grounding or open circuit of supervised circuits or power system failure. System trouble causes system to enter TROUBLE mode, including each of the following operations:
  - 1. Initiate audible alarm and visual indication by zone at the fire alarm control panel.
  - 2. Manual ACKNOWLEDGE function at control panel silences audible trouble alarm: visual indication is displayed until initiating trouble is cleared.

- F. Lamp Test: Manual LAMP TEST function causes alarm indication at each zone at fire alarm control panel.
- G. Water flow alarm sequence of operation will take precedence over trouble alarm sequence.

1.06 QUALITY ASSURANCE:

- A. Equipment shall be manufactured by a firm who has been actively manufacturing fire alarm systems of the type required and shall have supplied similar equipment to comparable installations and rendered satisfactory service for a minimum 10 years. All components of the fire alarm system shall be manufactured by the vendor supplying the equipment.
- B. Equipment manufacturer shall maintain factory trained personnel within 50 miles of the project site and shall be available 24 hours per day.
- C. All material and equipment shall be new and UL listed.
- D. All equipment and accessories furnished shall be the standard product of a single manufacturer.

1.07 SUBMITTALS:

- A. Submit shop drawings and product data in accordance with Section 16010.
- B. Provide wiring diagrams, data sheets and equipment ratings, layout, dimensions and finishes.
- C. Provide 1/16 scale drawings showing entire system layout and interconnection wiring.
- D. Contractor shall submit as-built record drawings, in sepia format, depicting layout of Fire Alarm System, to include component descriptions and locations, cable/wire runs, connections and power sources.

1.08 OPERATION AND MAINTENANCE DATA:

- A. Submit data in accordance with Section 16010.
- B. Include operating instructions and maintenance and repair procedures.
- C. Include manufacturer representative's letter stating that system is operational.

1.09 EXTRA MATERIALS:

- A. Provide two (2) spare fuses of each type.
- B. Provide two (2) keys of each type.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS:

- A. Simplex
- B. Notifier
- C. Pyrotronics
- D. Cerberus
- E. ADT
- F. Faraday

### 2.02 FIRE ALARM AND ANNUNCIATOR PANEL:

- A. Control Panel: Modular construction with semi-flush wall mounted enclosure. Enclosure to be fabricated from sheet steel with baked enamel finish, panel door to be supplied with full height 1/4 inch barrel hinge with lock and two keys.
- B. Power Supply: Power Supply to be 120 vac and of adequate power rating to serve control panel modules, remote detectors, remote annunciators, relays and alarm signaling devices. Include battery-operated emergency power supply with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes. Power supply to be 120 vac.
- C. System shall be closed circuit: electrically supervised, zoned, and with manual and automatic signal and control initiation. Automatic control functions shall include zoning of individual signal initiation devices by like devices, on a per floor basis or as required by local authorities, whichever is most stringent. Each zone shall be electrically supervised against disarrangement.
- D. Automatic and selective transmission of the NFPA approved fire alarm vibrating electric horn (with strobe where required) to all occupiable spaces including each guestroom. Horns shall sound at temporal march-time.

### 2.03 INITIATING DEVICES:

- A. Guest Rooms:

1. Guest room detector shall be 120 VAC single station (with battery backup), photoelectric, solid state LED light source and incorporate recessed power/alarm indicator and an electronic alarm horn rated at 85 dba at 10 feet. Detectors shall have an addressable interface and relay connected to the fire alarm system, unless otherwise required by code. Finish color shall be beige (off white).
2. A smoke detector shall be installed in all sleeping and living areas and connected to non-switched residence room circuit.
3. Handicapped Accessible Room: Locate detector above bed and provide a visible alarm device/xenon light to flash.

B. Other Areas:

1. Manual pull stations shall be red in color, manufactured from high impact Lexan, which will latch upon operation and remain so until reset with a key.
2. System smoke detectors may be photoelectric or ionization type, incorporating ability to be tested by a magnet. Detectors shall be ceiling surface mounted.
3. Furnish duct detectors, complete with remote reset/remote test switch with alarm lamp. Ionization type detectors with sampling tubes installed in supply and return air duct will be required on all air units rated to deliver 2000 CFM or more..
4. Heat detectors shall be rate-or-rise and automatically restorable.
5. Sprinkler system tamper and flow switches shall be furnished and installed by the fire sprinkler contractor. Fire alarm contractor shall be responsible for all wiring, connection and testing.

2.04 SIGNALLING DEVICES:

- A. Fire Alarm Power Branch Circuits: Building wire as specified in Section 16120.
- B. Alarm Bell: NFPA 72G; electric vibrating, single stroke, 10-inch bell with operating system behind dome. Rating: 81 dB at 10 feet.
- C. Alarm signal shall be wall mounted, housed in die cast aluminum frames and grills. For all interior applications use mini-horns with strobes, beige in color.
- D. Mini horns (guest rooms): Mini-horn units are to be installed in all guest unit bedrooms and be beige in color.



- E. Flashing lights: Accessible Guestrooms: flashing lights for the hearing impaired shall be semi-recessed, with side-viewing tamper-proof lens. White lens with the word "Fire" in raised red letters. Flashing lights may be an integral part of the accessible guest room detector and/or mini horn or may be a separate flashing device.

## 2.05 FIRE ALARM WIRE AND CABLE:

- A. Fire Alarm Power Branch Circuits: Building wire as specified in Section 16120.
- B. Initiating and Signal Circuits: Power limited fire protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.

## 2.06 REMOTE ANNUNCIATOR PANEL

- A. Provide a separate remote alarm panel at the registration desk as indicated on the plans.
- B. The panel shall indicate the guest room or other device in alarm.

## PART 3 - EXECUTION

### 3.01 INSTALLATION:

- A. Install system in accordance with manufacturer's instructions.
- B. Install audible and visual signal devices on walls or ceilings as indicated on plans.
- C. Use 16 AWG minimum size conductors for fire alarm detection and signal circuit conductors.
- D. Install signal wiring in conduit in exposed locations and in walls.
- E. Mount end-of-line device in box with last device or separate box adjacent to last device in circuit.
- F. Install all conduit and wiring and make final connections to sprinkler flow switches, sprinkler valve tamper switches and duct smoke detectors.
- G. Cover all smoke detectors to prevent dust contamination. Covers shall remain in place until hotel is turned over to owner.

### 3.02 PERFORMANCE TEST

- A. Conduct the acceptance test for the City of Hot Springs, AR which will require the following:
1. Representative of the fire alarm company.
  2. Representative of the electrical contractor.
  3. Representative of the sprinkler contractor.
  4. Portable radios with charged batteries (number to include walk, fire alarm control panel, and remote annunciation locations, as needed).
  5. Keys, ladders and hoses to reach test locations in place, as needed.
  6. Smoke detection test equipment as recommended by the manufacturer.
- B. Preliminary System Adjustment, balancing and fine-tuning shall be completed prior to performance test.
- C. Performance Test shall be executed per NFPA 72H and local fire department requirements.
1. Fire alarm system items requiring corrective action shall be completed by the Contractor, at no additional expense, at time mutually agreed upon between Architect and Contractor and such other parties as required.
- D. The following checklist shall be used by the contractor for preliminary testing and verification:
- ( ) Contractor certification testing completed:
    - Stray Voltages
    - Ground faults
    - Short circuits
    - Loop resistances
  - ( ) System testing completed
    - Individual initiating devices and circuits (All)
    - Individual indicating appliances and signaling line circuits
    - Main and stand-by power supplies
  - ( ) All wiring completed, components installed, and the fire alarm control panel and annunciator closed and ready for turnover.
  - ( ) All zones on fire alarm control panel and annunciator panel(s) clearly identified and marked as to device floor, zone, etc. With LCD annunciators, building diagrams are installed adjacent to the FACP and ANN.

- ( ) Audibility test (corridor & rooms ) - when possible, all horns or speakers adjusted to provide maximum db levels.
- ( ) All handicapped rooms' audio/visual devices tested.
- ( ) Operation of elevator recall functions tested.
- ( ) Duct detection and fan shut-down and alarm functions tested. Smoke damper closure and alarm functions tested.
- ( ) Exit signs and emergency lighting devices installed and tested.

### 3.03 GUARANTEES/WARRANTIES

- A. Upon system acceptance, furnish General Contractor with written guarantee that system adheres to contract documents.
- B. Provide installation warranty for 1 year. Included in warranty are to be quarterly inspections of the system during the warranty period.

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EOS

## 16740 – TELEPHONE/DATA/INTERNET WIRING OUTLETS (STATIONS)

### PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS: Drawings and general provisions of Contract including General and Supplementary Conditions and Division-1 Specifications Sections apply to work of this section.
- 1.02 DESCRIPTION OF WORK:
- A. WORK INCLUDED: This section covers requirements for the telephone/data/internet system from telephone distribution cabinets to device locations.

### PART 2 - PRODUCTS

- 2.01 MATERIALS:
- A. GENERAL: Provide a complete telephone/data/internet wiring system in accordance with these specifications to accommodate all telephone equipment within the building.
1. Where local codes permit contractor to use non-conduit cable. See Section 16120 Low Voltage Wiring for minimum installation standards.
  2. Communication cables shall have 24 AWG 4 pair insulated solid, bare or tinned, copper conductors. Cables shall be suitable for installation in return-air plenum without conduit, minimum category 5E.
  3. Provide telephone/data/internet outlet in each guest unit as shown on plans equal to Hubbell TSFJ11.
- B. ACCEPTABLE MANUFACTURES: Subject to compliance with local code requirements, provide telephone cable as manufactured by one of the following:

#### Catalog Numbers:

#### Manufacturer

West Penn  
AT & T  
AT & T  
Signal  
Guardian  
Carol  
Teledyne Thermatics

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

1. Furnish and install specified cable from each telephone location in ¾" conduit stubbed out into corridor and routed to the telephone backboard location. Conduit runs shall not contain more than three (3) 90 degree bends.
2. All cables shall be identified at both ends. Utilize marker tape to identify each multi-pair cable.
3. Cable runs shall be from each telephone outlet box to the telephone board. Leave minimum of 20 feet (measured from center of backboard) of slack cable at all backboards and 12 inches of slack cable at all telephone locations, coiled in the termination box.
4. Electrical Contractor shall perform continuity checks to determine if there are any shorts, opens, or grounds in the cables in which case they shall be removed and replaced with new.
5. At each outlet shown, terminate the cable in a telephone jack.
6. All exposed cables at backboards are to be routed and dressed in a neat workmanlike manner. At the backboards all exposed cables shall be bundled and secured to the wall to within 12" of the backboard. Final termination shall be by the telephone service provider.

3.02 MINIMUM REQUIREMENTS

A. Registration desk:

1. FAX Machine (2)
2. Credit Card Machines (2)
3. Telephone (3 ea.)
4. Data (2)

B. Lobby:

1. Telephone (House)

C. Business Room/Sales Room

1. Telephone (2)
2. Internet (2)

D. Laundry Room

1. Telephone (House)
2. Telephone (2 ea.)

E. Fitness Center

1. Telephone (House)

F. Guest Rooms

1. Telephone
2. Internet

3.03 CONDUIT

- A. Provide 2" conduit from registration desk up to satellite dish location on roof.

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EOS

## 16750 - CABLE TELEVISION WIRING

### PART 1 - GENERAL

#### 1.01 WORK DESCRIPTION:

1. All power and line voltage (120V or higher) control wiring and associated conduits to be furnished and installed by the Electrical Contractor.
2. All coaxial cable wiring and associated conduits shall be furnished and installed by the electrical contractor.
3. The amplifier, final cable termination connectors and 8-way taps shall be provided by the CATV provider.
4. All installations shall be done in accordance with the CATV supplier.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

##### A. GENERAL:

1. Provide a 4 inch conduit from the building electrical room to the property line outside the building. All 90 degree turns shall be long radius. Provide pull string. CATV service wire shall be furnished and installed by the CATV provider.
2. Provide RG-6 coaxial cable from the CATV entrance location to a 24"x24"x6" panel above the ceiling on each floor in the building. Cable shall be routed exposed above the corridor ceiling to conduit stub-outs from each guest room.
3. Provide 12 inches of slack cable at each end. Final connection and termination by CATV supplier. Mark each end of each cable with apartment or other location.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

- ##### A. GENERAL:
- Install a complete system for the operation of the television equipment requirements and these specifications.

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## 16920 - CONTROL WIRING

### PART 1 - GENERAL

#### 1.01 WORK DESCRIPTION:

1. All power and line voltage (120V or higher) control wiring and associated conduits to be furnished and installed by the Electrical Contractor.
2. All low voltage control/interlock wiring and associated conduits shall be furnished and installed by the HVAC Contractor.
3. All HVAC control devices (except manual motor start switches, hp rated control switches, and pilot light only units) for Electrical Contractor installed control systems shall be furnished and delivered by the HVAC Contractor to the Electrical Contractor for installation and connection. (Refer to Division 15 HVAC for equipment list.)
4. All installations shall be done in accordance with the approved drawings under the direct supervision of the HVAC Contractor.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

##### A. GENERAL:

1. Provide all conduit, wire and necessary appurtenances for a complete installation power system for the "furnished by others" equipment in accordance with these specifications and applicable code requirements.
2. Provide all disconnecting means called for on drawings and/or required by national electrical code or governing authorities.
3. Provide all fuses for equipment supplied by others.
4. Coordinate over-current protection types and sizes with the supplied equipment.
5. Manual motor start switch shall be equal to Square-D class 2510. Provide OL sized per HVAC Contractor instruction. Hp rated switches and pilot lights per section 16140 "Devices".



### PART 3 - EXECUTION

#### 3.01 INSTALLATION:

- A. GENERAL: Install a complete system for the operation of the HVAC equipment requirements and these specifications.
- B. The electrical contractor shall install and wire all line voltage thermostats furnished by the mechanical contractor. The electrical contractor shall provide line-voltage power to all hvac duct smoke detectors. Inter-lock wiring shall be by hvac or fire alarm contractor.

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EOS